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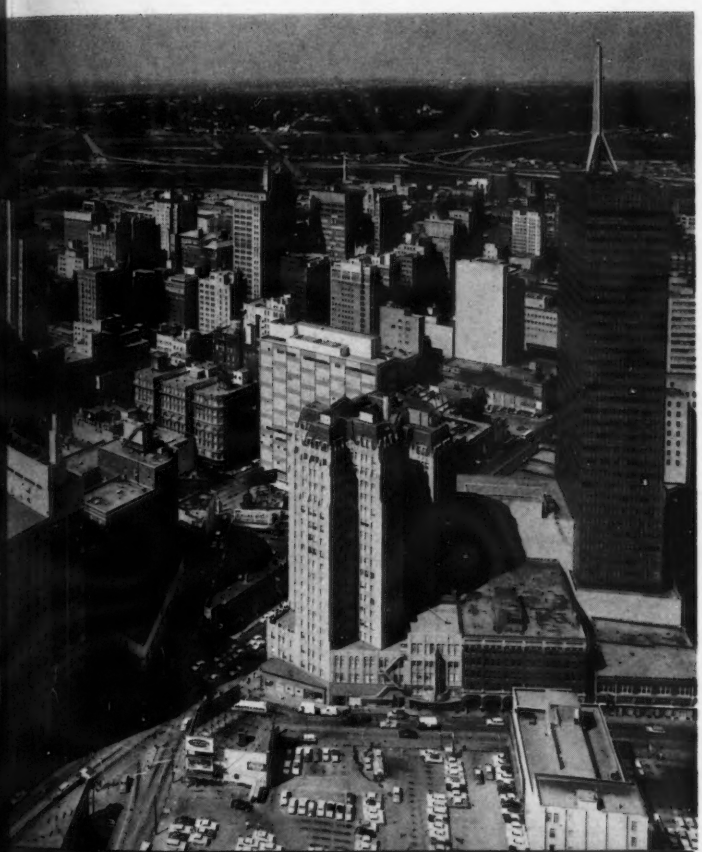

OFFICIAL PUBLICATION OF THE AMERICAN ASSOCIATION OF CEREAL CHEMISTS

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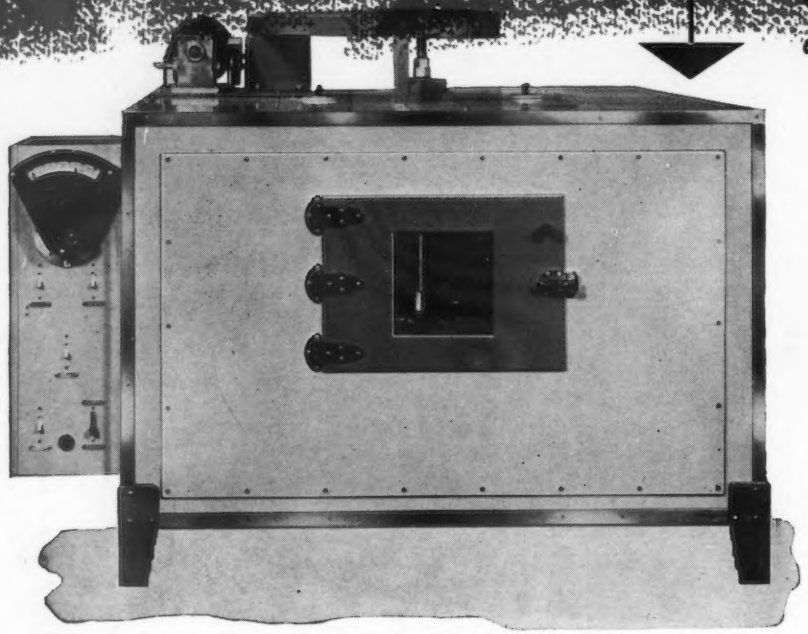

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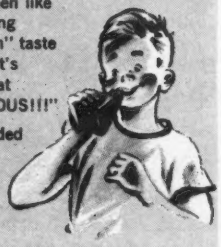

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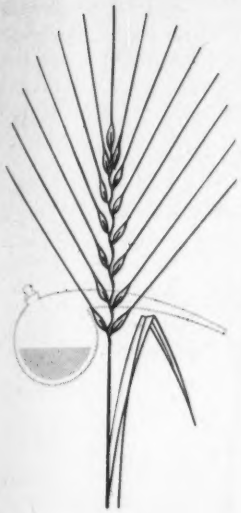

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COVER: View of downtown Dallas from the observation deck of the Southland Tower, the tallest building west of the Mississippi.

CEREAL SCIENCE today

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editorial

THIS MONTH OF April, 1961, we assemble for the 46th annual meeting of our Association. After more than forty years of striving, planning, and growth, we have developed into a recognized group of scientists having important responsibilities for cereal food consumed by several millions of people in all parts of the world. At the beginning, the Association meetings evolved around the important problems of the flour-mill chemist. Today, as exemplified by the program for the 46th annual meeting, we have become more diversified. Indeed, each year we have met new challenges and planned our programs accordingly. The program is designed to meet today's demands for knowledge in the rapidly expanding areas of formula feeds, continuous breadmaking, and industrial utilization of cereals.

Meetings of professional groups such as the American Association of Cereal Chemists have several objectives. They afford the opportunity for an exchange of ideas and the presentation of evidence upon which these ideas may be built, multiplied, and extended. They provide a stimulus for professional growth to which every scientist must aspire. They provide a means of fellowship leading to lifelong friendships among members. They provide opportunities for scientists to discharge their individual responsibilities to the public through the establishment of a means of communication. They provide the opportunity to encourage members to greater achievements. It is, indeed, significant that the American Association of Cereal Chemists has sought to establish several avenues of honor. Some of these will be used at the 46th annual meeting in Dallas.

The training course for food scientists immediately following the meeting will inform participants concerning action in the event of enemy attack or natural disaster. Cereal chemists cannot afford to pass up this opportunity to demonstrate their willingness to accept public responsibility.

Every member of the Association is urged to take an active part in his profession by supporting its many programs. Active participation for professional growth means more than mere membership. It means attendance at the annual and sectional meetings. It means sharing information so that the society as a whole may benefit from the accumulated knowledge. Concomitantly, the prestige of the individual and that of the organization for which he works is raised.

JOHN A. JOHNSON
President, AACC

a study revealing

regional variation in

The Starch Damage of White Bread Flours

By J. G. Ponte, Jr., S. T. Titcomb, Jocelyn Rosen, W. Drakert, and R. H. Cotton

Research Laboratories, Continental Baking Company, Rye, N. Y.

When wheat is milled into flour, a portion of the wheat starch becomes mechanically modified as a consequence of the grinding action of the mill rolls. The granules thus physically altered have often been referred to as "damaged" starch, and sometimes as "available" or "susceptible" starch. The nature of wheat flour endosperm cells, and the manner in which they break down into flour, with resulting starch damage, has been discussed by several investigators (e.g., 10,12,19).

Importance has been ascribed to starch damage in flour for many years. The interest in this area is reflected by the large number of research papers dealing with the effects of damage to starch on the breadmaking properties of flour. This work has been reviewed elsewhere (13,14,17,22).

Relatively few data of a quantitative nature, however, are to be found in the literature pertaining to flour starch damage; this is particularly true of flours milled in the United States. No doubt this paucity of information has been due, in part, to inadequate methodology. Workers have estimated starch damage microscopically by selective staining procedures, but such methods are tedious and generally not satisfactory (21). Hampel (7) has proposed a colorimetric method based on the solubility of the damaged starch granules, but as far as the authors are aware, little work utilizing this method has been published. Other workers (5,6,23) have used the increase of maltose in flour with beta-amylase after inactivation of the flour enzymes as an index of starch damage.

Sandstedt and Mattern (21) recently reported a procedure for estimating starch damage of flour, based on the fact that damaged starch is readily attacked by the amylases, while undamaged granules are markedly more resistant. This paper presents data on the starch damage, determined by the Sandstedt and Mattern method, of white bread flours milled in various areas of the United States, and relates other flour properties to this starch damage.

Baking Tests

The sponge and dough process was employed in the baking tests according to the following formula and procedure:

Ingredients	*Sponge*	*Dough*
Flour [a]	65.0	35.0
Water [b]		
Yeast	2.0	
Yeast food [b]		
Salt		2.25
Sucrose		4.0
Corn sugar (commercial dextrose)		5.0
Nonfat dry milk		3.5
Lard		3.0
Mono- and diglycerides		0.5
Dough conditioner		0.3
Calcium phosphate		0.25

[a] Total of 800 g.flour (14% moisture basis) was used.
[b] Optimum as determined by preliminary baking tests for each flour.

Mixing

Three well-matched Hobart A-120 mixers were used, with McDuffee bowls and forks. Sponges were mixed 0.5 minute at speed 1 and 4 minutes at speed 2. Doughs were mixed 0.5 minute at speed 1, followed by the optimum time at speed 2 as determined by preliminary baking tests for each flour.

Fermentation

Sponge temperature after mixing was 80°F. Sponges were fermented for 4.5 hours at 80°F. in covered containers. Dough temperature after mixing was 81°F. The dough was given a floor time of 40 minutes. Two 19-oz. pieces were scaled from each dough and given an intermediate proof of 10 minutes. The dough pieces were machine-molded and pan-proofed at 110°F. and 75% r.h. to a height of ¾ in. above the pan. The loaves were baked 21 minutes at 415°F. After a cooling period of 70 minutes at room temperature, the loaves were placed in polyethylene bags and stored overnight at room temperature. Their volumes were measured the following morning by rapeseed displacement, after which they were scored.

Analytical Methods

Starch damage was estimated by the method of Sandstedt and Mattern[1] (21). Protein, ash, maltose, gassing power, farinograph, and amylograph tests were conducted by procedures outlined in *Cereal Laboratory Methods* (2). Flour particle size determinations were made by means of a modified Andreason pipet assembly and procedure[2]. Chopin extensimeter tests were carried out on the modified apparatus described by Hill *et al.* (9), by a procedure essentially similar to that outlined by these authors.

Effect of Increased Levels of Starch Damage Produced by Ball-Milling

It was considered desirable, previously to a study of the extent of

[1] The low-maltose amylase (standardized according to alpha-amylase activity as required in this method) was produced and kindly furnished by the Wallerstein Company, Staten Island, N.Y.

[2] The modified Andreason apparatus and procedure were developed at General Mills, Inc., and made available to this laboratory, for which the authors are grateful.

starch damage in flours from various areas of the country, to relate the level of starch damage, measured by the Sandstedt and Mattern procedure, in a given flour to its baking quality, diastatic activity, and physical dough properties. Thus, by using one flour system and by increasing the amount of starch damage, the effect of starch damage could be evaluated separately from other factors existing between flours milled from differing wheat blends, or milled at different times.

One Southwest flour (12.0% protein, 0.43% ash) was chosen at random from the flours assembled for these studies. Portions of this flour were subjected to ball-milling for 5, 10, and 20 hours; these were then analyzed and bake-tested. The results obtained are presented in Table I.

The Sandstedt and Mattern analytical method showed systematically increasing starch damage with increasing time of ball-milling, as is shown by this table.

Values for maltose and 6th-hour gassing power grew in magnitude with greater starch damage, an effect noted by many workers (1,11, 18). The increase in these "enzymatic activity values" appeared to be linear with starch damage up to about 10% starch damage, after which a decided leveling occurred. The leveling may have been at least partially due to some flour amylase inactivation as a result of prolonged ball-milling.

Farinograph absorption, peak time, and tolerance of the flour became greater as starch damage increased, the first relationship apparently being a linear one. The contribution of starch damage to increased water absorption in flour has been noted by Greer and Stewart (6), among others. The internal pressure of dough bubbles made on the modified Chopin extensimeter also increased in magnitude with greater flour starch damage, probably as a result of the increased stiffness of the doughs. These data bear out the observation by Bird (4) that physical dough tests may be misleading when conducted on flours with high starch damage.

Loaf volumes of the bread made with the series of ball-milled flour decreased with greater starch damage; general loaf quality also deteriorated, although little change was noted with the first moderate increase of starch damage. Hampel (8) also found that increased starch damage in flour led to decreased loaf volume and poor texture.

A marked increase in dough "stiffness" was observed as starch damage was increased. (The same absorption was used in all doughs.) Reports in the literature (17,20) indicate that a sponge may be expected to soften during fermentation when it is made from highly damaged starch granules. No such degradation of highly absorptive, damaged starch granules. No such softening occurred in the present work, although sponges made from the highly damaged flour were more porous than the other sponges.

When studying effects of ball-milled flours, one should, of course, recognize that flour constituents other than starch may be affected by prolonged ball-milling. Hence, these data must be interpreted with due consideration.

Starch Damage in White Bread Flours

The next phase in our study was to determine the amount of starch damage in a variety of flours, representing a relatively wide geographic as well as milling area, and to relate this starch damage to other flour parameters, enumerated in the next section. Thirty-nine different brands of commercially milled white bread flour produced in 34 mills by 24 milling companies were evaluated. These flours were milled in 15 states of the United States during the latter part of 1959 and the early part of 1960.

Table II shows the average amount and distribution of starch damage in flours grouped into four somewhat arbitrarily chosen geographical regions based on flour-milling location. These data demonstrate that Southwest flours, the major group, had less average starch damage than any of the other groups. The flours milled in the West (Pacific Northwest and West Coast) showed the greatest average starch damage; apparently the wheats used to make bread flour in this area are particularly susceptible to starch damage. The flours milled in the North Central and East regions also had greater average starch damage than the Southwest flours, although the former regions were represented by a relatively small sampling. It should be recognized that the East flours (milled in New York State) differ in that their parent wheat(s) were not locally grown; this may also have been true to some extent in areas of the West. Presumably the milling locations of the other flours were similar to the growing locations of the wheats from which they were milled.

Relation of Starch Damage to Other Flour Parameters

Results of chemical and physical tests of the flours are given in Table III, which shows both mean value and the range.

The flours showed a wide range of values for most of the analyses, a range quite typically encountered when a set of heterogeneous bread flours were examined. Such data bring out the difficulty of determining comparative flour quality by means of conventional flour tests, since experience shows that relatively wide differences in flour test results often are only poorly related to commercial bread-baking quality.

Correlation coefficients were calculated for all interrelationships of the various analyses. The signifi-

cant correlations are presented in Table IV.

Table IV shows starch damage to be significantly correlated with maltose figure, 6th-hour gassing power, farinograph absorption, and loaf volume. These correlations bear out the observations made above with the ball-milled flour, and by many other investigators.

Figure 1 is a plot of starch damage versus 6th-hour gassing power. The flours milled in the West and Southwest areas form two principal groupings, the former occupying a position of greater starch damage and greater gassing power than the flours milled in the Southwest area. Although not shown, a plot of starch damage vs. maltose figure strongly resembles that of starch damage vs. gassing power. No significant correlation between the third measure of "diastatic activity," amylograph curve height, and starch damage was obtained. Starch damage vs. farinograph absorption is shown in Fig. 2.

The correlation of 0.78** obtained for farinograph absorption and starch damage is of interest, for these absorption data were taken from flour mill reports covering the flours used in this study and thus involve many farinograms. One may speculate that a higher correlation would have resulted if all the farinograph absorptions had been measured on one instrument. Figure 2 also shows the separate groupings of flours milled in the West and Southwest areas noted in the preceding curve.

Figure 3 illustrates the relation of loaf volume to starch damage. While the trend toward decreased loaf volume with increased starch damage is significant when all the flours are considered, the relation seems to be less clear-cut when the two major groups, West- and Southwest-milled flours, are taken separately. This point will receive further attention in a subsequent section.

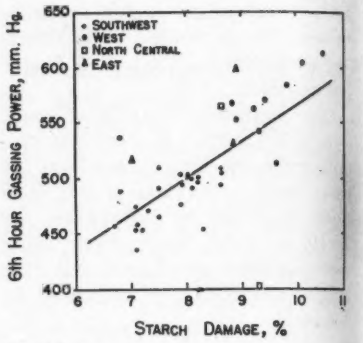

Fig. 1. Relationship between starch damage and 6th-hour gassing power for 39 white bread flours ($r = +0.78^{**}$). Line shows regression of gassing power on starch damage.

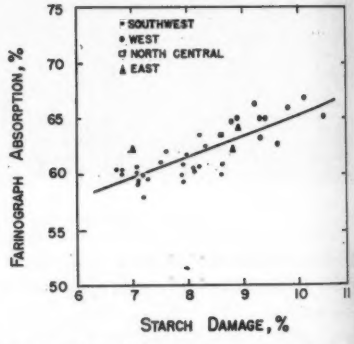

Fig. 2. Relationship between starch damage and farinograph absorption for 37 white bread flours ($r = +0.78^{**}$). Line shows regression of farinograph absorption on starch damage.

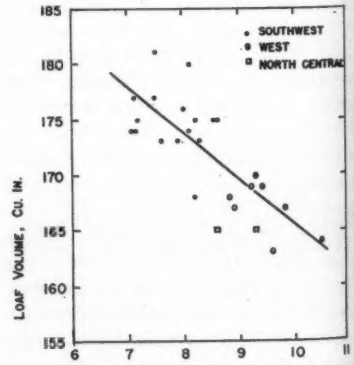

Fig. 3. Relationship between starch damage and loaf volume for 26 white bread flours ($r = -0.82^{**}$). Line shows regression of loaf volume on starch damage.

Table II. Starch Damage Data for White Bread Flours, Showing Mean Values and Distribution

Starch Damage Range	Number of Flours				
	Southwest	East	North Central	West[a]	All Regions
%					
6.6– 7.0	3	1			4
7.1– 7.5	8				8
7.6– 8.0	6				6
8.1– 8.5	5				5
8.6– 9.0	3	2	1	2	8
9.1– 9.5			1	3	4
9.6–10.0				2	2
10.1–10.5				2	2
Total	25	3	2	9	39
Arithmetic mean of starch damage, %	7.7	8.2	9.0	9.5	8.2

[a]Pacific Northwest and West Coast.

Table III. Analytical Values of White Bread Flours

Flour Test	Number of Flours Tested	Range	Arithmetic Mean
Protein, %	39	11.0-12.7	12.09
Ash, %	39	0.39-0.47	0.436
Maltose, mg.	39	232 - 387	313.3
Sixth-hour gassing power, mm. Hg	39	393 - 606	447.1
Amylograph units, B.u.	39	315 - 1000+	497.8
Loaf volume, cu.in.	29	157 - 183	172.9
Farinograph absorption, %	37	58.0-67.0	61.99
Mass mean Stokes diameter, microns	39	46 - 62	53.8

Table IV. Correlation Coefficients of Various Flour Tests on White Bread Flours

	Maltose Figure	6th-Hour Gassing Power	Farinograph Absorption	Loaf Volume	Mass Mean Stokes Diameter
Starch damage	0.76*	0.78**	0.78**	−0.82**	.
Maltose figure		0.90**	0.64*	..	..
Sixth-hour gassing power			..	−0.86**	..
Farinograph absorption				−0.87**	..
Loaf volume					−0.61*

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Table IV shows that no significant correlation was found between starch damage and flour coarseness as measured by the mass mean Stokes diameter of the flours. However, flour coarseness appeared to be associated with flour milling location, as was found for starch damage. This is shown in Table V.

The flours of the Southwest region had an average mass mean Stokes diameter of 52 microns, whereas that of the other regional groups ranged from 56 to 58 microns. The Southwest flours thus were somewhat finer and had less starch damage than the flours milled in other sections of the United States.

Other significant correlations shown in Table IV included those of farinograph absorption with maltose and loaf volume (farinograph absorption vs. gassing power, $r = 0.55$, was significant at 10% level). These correlations may probably be indirectly attributable to starch damage; farinograph absorptions are greatly influenced by starch damage, and thus in turn could be related to maltose, loaf volume, and gassing power.

The negative correlation, $r = -0.86^{**}$, between loaf volume and gassing power may well also have been a function of starch damage. As starch damage in a flour increases, gassing power goes up and loaf volume apparently goes down, as was shown in the study on ball-milled flour.

The correlation $r = -0.61^{*}$ shown in Table IV for loaf volume and mass mean Stokes diameter was unexpected, since literature reports (3,23) have indicated that, in general, finer flours lead to poorer baking results. No significant correlations were obtained, however, when the mass mean Stokes diameter of the Southwest and West flours were compared separately to loaf volumes.

It may be noted that protein content was not related to results of any of the other analyses considered in Table IV. This lack of correlation is perhaps a result of the rather narrow range of protein found in these flours. Protein (shown in Table III) ranged from 11.0 to 12.7%. The average protein for the flours milled in each of the four geographical regions (Southwest, East, North Central, West) was essentially identical, ranging from 12.0 to 12.3%.

Starch Damage of Southwest Flours

The previous section dealt with a variety of bread flours milled in various parts of the United States. While significant correlations between some of the flour tests were obtained, it appeared questionable that these correlations would hold true for a single group of flours showing a narrower range of starch damage, such as the Southwest group. For this reason, a separate study was conducted on ten of the Southwest flours. In this study, values for loaf volumes and loaf quality represented the arithmetic mean of six doughs (twelve loaves) per flour. Tests were made for correlations among the factors starch damage, maltose number, amylograph value, loaf volume, and loaf score. Only one of these was significant. This correlation, $r = -0.73^{*}$, for maltose and amylograph, is of interest since no significant relationship for these factors had been found in the more comprehensive flour survey mentioned previously. Because the maltose test is a measure of the enzyme-substrate complex (14), one interpretation of these results might be as follows. When the substrate concentration (damaged starch) in a group of flours varies appreciably, the substrate correlates with the maltose figure. This held true in the survey of 39 flours ($r = 0.76^{*}$). However, when the concentration of substrate in a group of flours is similar, as in the case of the Southwest flours, then the maltose figure would be expected to be correlated to enzyme activity. The correlation $r = -0.73^{*}$ between maltose and amylograph for the Southwest flours suggests that this is the case.

The correlations of starch damage with loaf volume and starch damage with loaf quality for these Southwest flours were just below that required for significance at the 10% level; they were, however, in a negative direction, as was the significant correlation obtained for starch damage vs. loaf volume for all the 39 flours. Many flour factors, known and unknown, govern over-all baking response; the spread in starch damage for the Southwest flours (7.5 to 8.7%) was rather narrow so that, conceivably, any effect starch damage might have had on baking response could be easily masked by the other, perhaps more dominant, flour factors.

Summary and Discussion

The recently developed Sandstedt and Mattern method was used to estimate and compare the starch damage in a rather wide selection of white bread flours milled in the United States. Starch damage ranged from 6.7 to 10.5% in the flours; the arithmetic mean was 8.2%. Less starch damage was found in flours milled in the Southwest than in flours milled in other regions of the United States. Starch damage, as determined by the Sandstedt and Mattern procedure, was found to be related to the diastatic activity, absorption, and baking performance of flour. However, in a group of ten Southwest flours having a rather narrow range of starch damage, the relation of baking quality to starch damage was obscure.

One may speculate that an optimum degree of starch damage exists for a particular flour, at least as far as conventional sponge and dough processing is concerned. During sponge fermentation, the free sugars of flour are soon exhausted by yeast, and production of maltose from damaged starch granules by amylases appears to be necessary for continued fermentation activity (15,16). However, an excess of starch damage, more than is required to support sponge fermentation, may not be conducive to optimum flour performance in

(Please turn to page 125)

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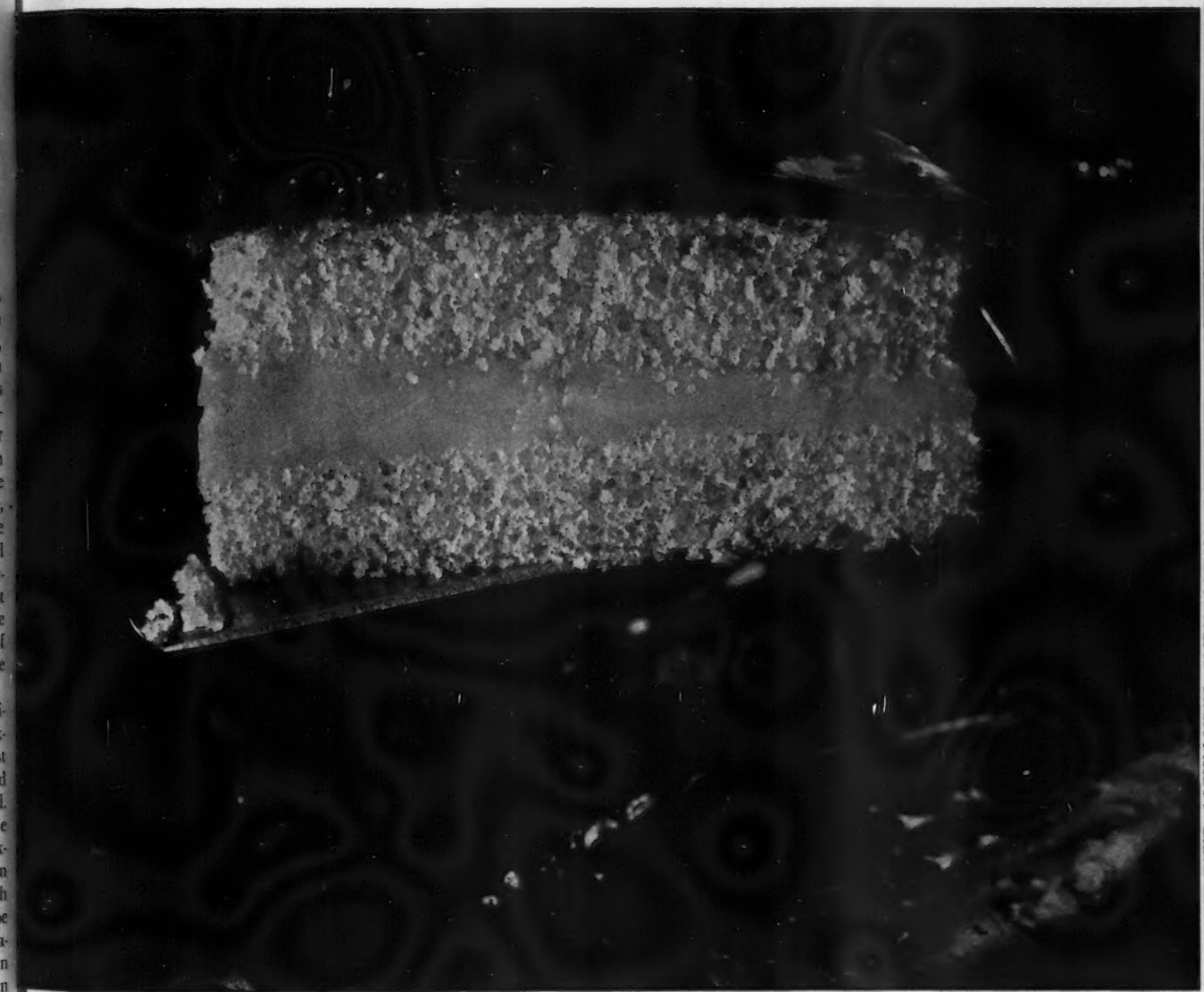

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AN ARTICLE WITH this title appeared in the May 1925 issue of CEREAL CHEMISTRY. The author, Dr. E. A. Fisher, who was the first director of research of the Association that had been founded less than two years earlier, described the founding of this unique co-operative effort between the British flour milling industry and the government Department of Scientific and Industrial Research. An experimental mill had been acquired, and plans had been made for laboratories and baking facilities. The main lines of contemplated research were described.

Today the Research Association of British Flour-Millers can point with pride to a record of accomplishment that justifies the vision of its founders and is a credit to the scientists of its staff. Not only the British flour milling industry but cereal science everywhere has benefited from the scientific and technological investigations carried out at St. Albans.

38 years of progress

— the story of the

Research Association of British Flour-Millers

By L. Hector Read
President of the Council of British Flour-Millers
and T. Moran
Director of Research, Research Association of British Flour-Millers, St. Albans, Herts, England

History

Soon after the founding of the Association, Dr. Fisher was joined by Dr. C. R. Jones, Dr. P. Halton and Mr. W. E. Spencer, all three of whom are still on the staff, and by Mr. R. H. Carter.

The concept of the Research Association was, at the outset, a novelty to many of the millers, and inevitably too much was expected of it. At the beginning it was linked up with a small commercial flour mill, and this explains the location of the laboratories in St. Albans. However, in 1926, the mill was sold and since then the Association has arranged whenever necessary to carry out commercial-scale tests in members' mills. This has worked out well and much expense to the Association has thus been saved. Since the war, the emphasis of work in the laboratories has been on basic research rather than on *ad hoc* or large-scale research. The relationship between the industry and the Research Association is such that there has never been any difficulty in arranging for follow-up of laboratory research in a commercial mill.

In 1939 Dr. T. Moran replaced Dr. Fisher as Director of Research. At the outbreak of war the milling industry came under the control of the Ministry of Food, and the work of the laboratories was at once given up to research and experimental efforts for the Ministry.

Prior to and immediately after the beginning of the war, the Research Association worked on many technical and scientific problems involved in the enrichment of white flour, a project which had been initiated by the British milling industry and which received government approval in June, 1940. By March, 1942, about 38% of the flour of the country was sold enriched and the bulk of the technical work involved, including tests on the purity of the constituents, the preparation of the master mix, and the levels in the finished flour, had been carried out by the staff of the Association. At this stage, however, national "85% extraction" flour was introduced and enrichment was discontinued.

In March 1943, the Ministry took over the management of the laboratories, at the same time naming them "The Cereals Research Station." The laboratories were returned to the Association on January 1, 1946.

Front of Cereals Research Station from northwest corner as seen from Old London Road. The newer buildings (right) were built at the commencement of World War II, in connection with the milling industry's flour enrichment scheme, and have now become part of the Station. The new bridge crosses an internal roadway leading to a courtyard behind the oldest block (left), and another serving a loading bay and a car park behind the right-hand building. The new analytical and baking laboratories are mainly on the third and fourth floors of the tallest block.

Cereals Research Station from the rear (southeast corner). The nearest building (with pitched roof) is the prewar experimental milling block. The windows showing in the extreme left-hand (flat-roofed) block are those of the new Committee and Common Rooms. The taller windows showing in the highest building are those of the new analytical laboratories. The (prewar) flat-roofed block on the right houses the library and various older laboratories. The right-hand pitched roof (with dormer window) belongs to the oldest part of the building and faces Old London Road. In the left background is a fine view of the Norman abbey.

During the war, the Research Association was concerned with a number of major practical problems including:

(a) The specification for national flour (with the Medical Research Council);

(b) The milling of national flour of maximum vitamin content;

(c) The storage of national flour;

(d) The permissible amounts of diluents, such as barley, oats, rye, maize, and potato in flour and bread; and

(e) The addition of *creta preparata* to flour.

In addition, the over-all quality of wartime flour and bread (particularly its nutrient content) was kept under contstant review. This work involved thousands of analyses and the results were published in a series of papers in *Nature*.

However, basic research was not neglected. This was one of the first laboratories to develop microbiological methods for the estimation of individual B vitamins, and the discovery that beer is relatively rich in riboflavin and nicotinic acid stemmed from this work.

During the war and since, the work of the laboratories has given increased emphasis to the nutritional aspects of flour and bread. This was the result of food shortages during the war and the revival later of the controversy of brown vs. white bread. The latter resulted in the appointment of the Cohen panel whose report was published in 1956. This report concluded that in the diet of Great Britain there was nothing to choose between bread made from high-extraction flour and that from white flour suitably enriched with thiamine, nicotinic acid, and iron. The Research Association helped the milling industry to prepare the case it presented in favor of enriched white flour. Closely allied to the nutritional work has been that of the action of chemical improvers on flour. In the Association laboratories, the toxic factor of agene, methionine sulphoximine, was first isolated and synthesized.

Since 1936 work has been carried out in collaboration with the National Institute of Agricultural Botany at Cambridge, assessing the milling and baking properties of new varieties of home-grown wheat. For the past twelve years, a research program has been conducted on oats and oat products for the oatmeal millers of England, Scotland, and Northern Ireland. This work has been of great value to participating oatmeal millers.

Under Public Law 480, the U.S. Department of Agriculture has offered two grants for research including further development of the work on antioxidants in oats and wheat.

The Council, representing the British milling industry, has held that the main function of the Research Association is to carry out basic research. This policy has been amply justified by the practical results from application of knowledge developed through the research program. An effort is made to keep the staff in touch and in sympathy with millers' day-to-day problems. An important project has been work on the separation from ordinary flour by air classification of fractions rich or poor in protein. This may prove to be a major development in the history of flour milling.

For the past ten years the Research Association has kept its members and government departments acquainted with its work through the medium of a quarterly bulletin. This has been an outstanding success.

Research Accomplishments

It is convenient to divide the work of the laboratories into three phases: 1) The period 1924-39, 2) the war years, 3) the postwar period. Each of these will be discussed separately.

1924-39. During this period a total of 66 papers were published. It is of interest that of these papers those by Halton and Scott-Blair on the rheology of dough, by Halton and Fisher on the storage of wheat flour, and by Hutchinson on the staling of bread are still quoted in current literature more than 20 years later. Equally, the work by Jones on starch damage during milling, published in 1940, six years after its completion, is still the standard paper on the subject.

This period was even more fruitful than the number of published papers would suggest, because some of the research never went beyond patents or confidential reports issued to members. Among these might be mentioned:

1) Two reports on the bolting efficiency of sifters. This work resulted in the modification of commercial sifters to increase their efficiency and effect a saving in the space and cost in the construction of a flour mill.

View of part of the experimental bakery.

2) The work showing that the diastatic activity of a flour could be regulated by the conditions of milling.

3) The work on the close analysis of many factors that affect gas production in doughs.

4) Investigation of self-rising ingredients. One of the findings suggested the advantage of using a mixture of two parts sodium acid pyrophosphate with one of monocalcium acid phosphate, which is now in commercial use.

5) Three reports on the improvement of flour by heat-treatment which showed individual flours react differently, thereby greatly limiting the use of heat-treatment in commercial practice.

It is easy now to regard many of the papers published during this period as limited in scope, but at that time, cereal chemistry was practically a new science; certainly the work carried out then provided the necessary background of knowledge and experience on which the Research Association has thrived ever since, and never more than during the war years. The research of this period could best be described as essentially technological and chemical.

The War Years

Bread was then our most important food, not only in its own right but also to make up energy requirements when other foods were in short supply. At the same time, remembering the lessons of the first World War, the government stressed the need for good, palatable bread at all times. All scientific and technical problems on flour and bread were referred to the Research Association for solution, although in turn they often called on the assistance of scientific colleagues in industry. In retrospect, perhaps the most intriguing was that of the permissible amounts of diluents that could be incorporated in bread. The problem, as stated, reflected the size of wheat stocks and losses of grain cargoes. At one time it would be the maximum amounts which would still give "edible bread" and at another it might be the amounts to give (a) best quality commercial bread or (b) satisfactory commercial bread – a fine distinction.

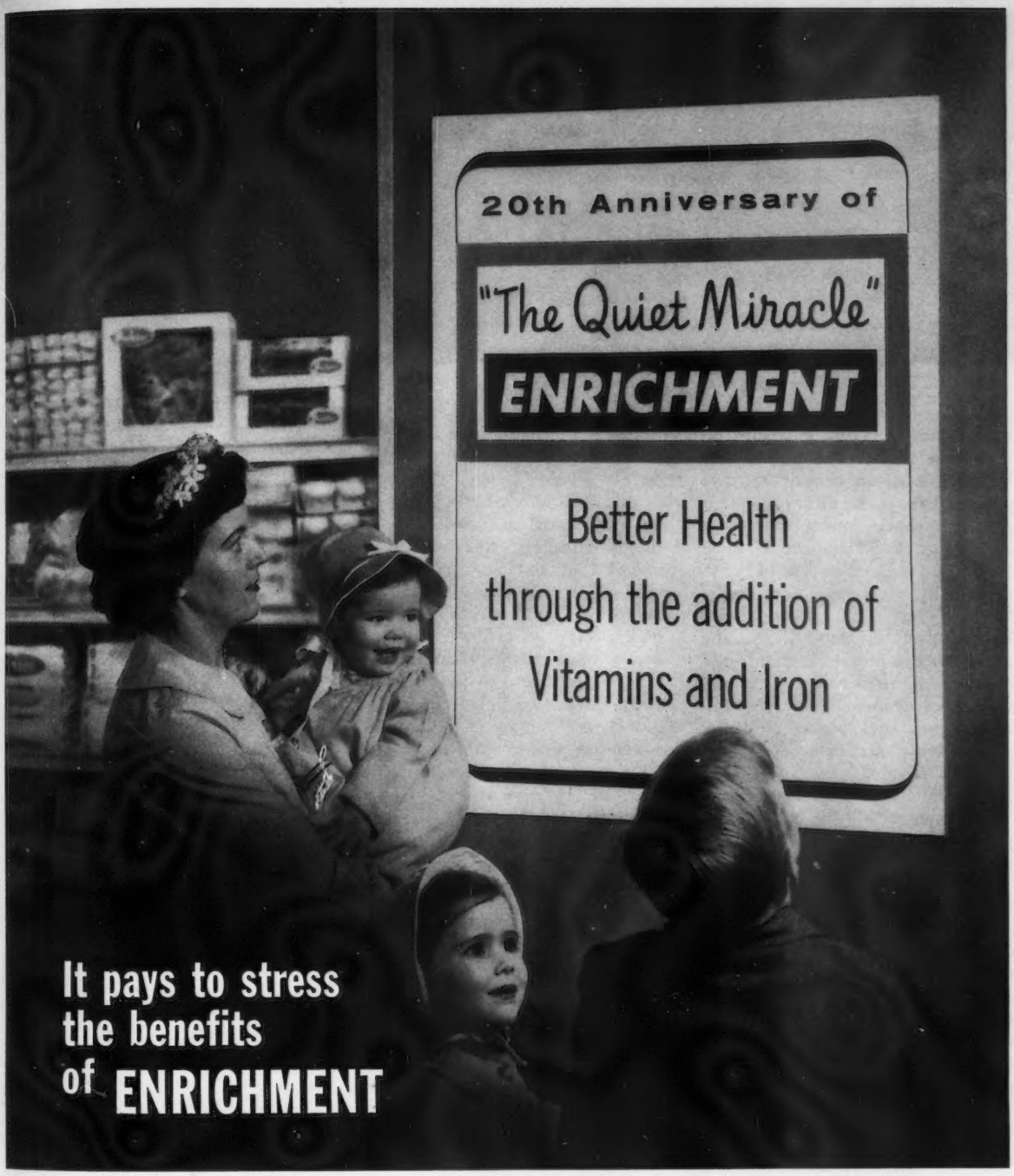
Apart from this technological research, fundamental research continued including 1) Hinton's discovery that thiamine in wheat is largely concentrated in the scutellum part of the germ. This, together with the finding that the outer endosperm is very rich in the many other nutrients, provided the specification for wartime flour of optimum nutrient content and was also the justification for lowering the extraction rate of wartime flour from 85 to 80%. This work was extended to rice and had practical application in connection with the parboiling of rice to retain its vitamin content. 2) Halton observed that *creta preparata* did not significantly increase the pH of bread and as a result, there need be no fear of "ropy" bread. 3) The development of microbiological methods for estimating riboflavin and niacin in flour and of a chemical method for thiamine in flour. 4) Slight overheating of wheat during drying can spoil its baking quality. Safe conditions were worked out by Halton using his Extensometer and by Hutchinson using the delicate criterion of germination capacity. 5) High-extraction flours contain outer layers of the wheat grain which are only 40% digestible by man. It was shown that the digestibility of a flour can be correlated with its fiber content. 6) The extent of the destruction of phytic acid during baking of bread was studied by Pringle and Moran.

The wartime program can be described as technological and chemical, with a strong emphasis upon nutrition.

Postwar Research

The war had raised many nutritional problems, notably that concerned with the relative merits of white and brown breads. The Research Association provided and analyzed the flours used in the Widdowson-McCance experiments on German school children comparing white and brown breads. No differences were found in the growth rates and general health of the children. The result of this experiment caused a good deal of controversy, but it now seems clear that, certainly with respect to protein, the deciding factor was the compensation for the slight lysine deficiency in white bread by the small amounts of animal products in the diet. From the point of view of protein, the difference between white and brown flours in promoting growth is due entirely to the difference in lysine content as shown by Hutchinson, Pace, and Moran. They have now shown that from the protein angle, the effect of germ or of milk in bread in increasing the growth of weanling rats is related quite simply to the lysine contributed by these additions to the bread formula.

The Association has continued its emphasis on studies of the nutritional value of flour and bread. One of the most interesting contri-



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View of part of the analytical laboratory.

butions has been on the lysine and threonine factors. This work has been reported in a series of five papers. Perhaps the most important practical conclusion is that in a diet adequate in respect to these two amino acids, the value of bread protein is at least 80% that of the best protein, i.e., that of whole egg. These results emphasize, first, the importance in practical nutrition of considering the diet as a whole, and second, of evaluating the proteins in a mixed diet in terms of the amino acids they provide rather than in terms of their origin, from animal or vegetable sources. When judged in this way wheat proteins make a substantial contribution to human protein nutrition. This was exemplified even in the very severe test imposed by the conditions of the Widdowson-McCance investigations, where wheat flour was the major source of protein. Nutritional research of a more direct nature has been continued by Hinton in his studies on the distribution of the different nutritional factors in the wheat grain. Already these results are giving leads for further biochemical exploration of the wheat grain.

Flour Treatment

In 1946, Mellanby published his discovery that flour treated with nitrogen trichloride (agene) produced fits in dogs. As agene was at that time in general use as a bleaching improver, it was important to know if flour treated with it is harmful to man. It was decided that the first step should be to isolate and identify the toxic compound. Accordingly, for four years that was the main item in the research program. In all, ten papers were published giving the results of this research, and finally, the factor was isolated and synthesized. Although simple in structure, it was one of a whole class of compounds new to organic chemists. Though the toxic factor affects many animal species, no evidence has ever been found that it is harmful to man. Nevertheless, its use for flour treatment has been discontinued; it has been replaced by another gaseous improver, chlorine dioxide. This too has been carefully studied with an intensive investigation to ascertain the chemical changes in flour treated with it. It was found that while most of the vitamin E was destroyed, the only other changes recognized were minute changes in certain of the amino acids (notably, tyrosine, which formed mono- and dichlorotyrosine), and the chlorination of some of the unsaturated fatty acids by the free chlorine present.

Along with developing nutritional information, it was natural that increasing emphasis should be placed on biochemistry. Heathcote, Pace and McDermott showed, first with a bacterium, *Leuconostoc mesenteroides,* and later with sheep brain tissue, that methionine sulphoximine inhibited glutamine synthesis. Martin, after finding that oat lipase was located in the pericarp of the groat, attempted to isolate pure oat lipase. He and Peers succeeded in concentrating the lipase in their extract 2,000 times. Methoxy and dimethoxybenzoquinone have been isolated from wheat germ by Cosgrove *et al.* They are present as glycosides and their distribution in the wheat grain has now been worked out by Daniels. The function of these two substances is still not clear, but recently quinones have cropped up in the work on antioxidants.

Expectations

From a long-range viewpoint, progress will be greater as more is learned about the actual chemistry of the wheat grain. The vitamin picture should soon be complete. Over the last five years much attention has been given to the proteins of wheat.

Presently, the composition of the lipids of wheat and oats and the effects of chemical improver treatment on the lipids in flour are being studied. This will inevitably be linked with nutritional aspects as well as baking quality.

Interest in the starch of wheat and flour continues because of its importance in fermentation, baking, water absorption, and staling. A new facet of this interest has now been developed since work has started on the possibilities of developing new industrial outlets for flour, in which most important are the properties of starch.

Achievements

By and large, the success of the Research Association may tend to be judged by its technological achievements and the basic research program is largely the means to that end. Examples that might be cited are 1) the work being carried out to improve the quality of domestic British wheats, 2) the warm breaking of wheat to give increased flour yields with less bran fragmentation, 3) the advice given on the milling of national flour during the war, 4) the prevention of rope by the addition of monocalcium acid phosphate to flour, 5) the evaluation of the bread- and biscuit-making quality of flour by means of the Extensometer, 6) the factors determining absorption of water by flour, 7) the treatment of imported wheat attacked by *Eurygaster* (buggy wheat), 8) the correct conditions for drying damp wheat, 9) the preparation of oatmeal free from fat-splitting enzymes, 10) the conditions of kilning necessary to pro-

(Please turn to page 121)

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46th Annual Meeting

THIS YEAR'S PROGRAM, for the AACC's 46th Annual Meeting, upholds the previous record of a year ago for size – seventy-three technical papers. So much for quantity: those in charge are confident that quality will be equaled, if not excelled. Opening on Monday, April 10, the technical sessions at the Baker Hotel, Dallas, Texas, will continue through Thursday noon, April 13. Registration, board and committee meetings, and the President's Reception, as usual, are scheduled for Sunday, April 9.

Program

Program Chairman Byron S. Miller, of Kansas State University's Department of Flour and Feed Milling Industries, is presenting a set of technical papers of broad coverage in interest and practical usefulness. As the Preliminary Program indicated (see February 1961 issue of THIS JOURNAL), research papers predominate, but those on applied aspects are present in good numbers. The latter are represented by sessions on "Chemical Residues in Cereal Products" and "Continuous Breadmaking"; by two sessions on Feed Technology, and two on ideas for the laboratory – "Layout" and some ingenious "Techniques and Gadgets." New help in understanding and solving many problems, such as those in the milling and storage of grain, will come to light in the session on "Chemistry and Technology of Grain," and others.

The Inspirational Address

Guest speaker Dr. James H. Jauncey, minister of the First Christian Church of El Paso, Texas, will give his views on "The Scientific Revolution." As qualification, Dr. Jauncey's background of education and experience ranges through engineering, psychology, education, religion, and journalism. He holds ten academic degrees, earned at universities in Australia, England, and California.

Dr. Jauncey was reared in the Australian Bush, in a family living under pioneering conditions. He achieved his education by means of competitive scholarships. During World War II he was technical adviser to the Australian Government, and afterward head of the Department of Science and Mathematics at Kings College in that country. After coming to America in 1948 he was professor of Theology and Philosophy of Religion at California Baptist Seminary. He left there to become an engineer on a scientific project at White Sands Missile Range in New Mexico, and was called to his present position in 1958. During the years, Dr. Jauncey has had constant experience in clinical psychology and has published many articles. He is in heavy demand as a lecture speaker. Much has been packed into the 44 years of his life, and he is known for the skill with which he distills his experiences and gives their essence in an inspiring message.

Honorary Memberships

A feature of Monday morning's program is the conferring of Honorary Membership on six men, elected to receive this honor by the AACC membership, through a special mail ballot. Over many years they have served the Association notably by way of committee work and offices held, or they have won wide recognition in the profession for their achievements, or both. These are the first honorary memberships to be conferred since 1958 when two were given at the Annual Meeting held in Cincinnati that year.

Of each recipient, it may be said that he has promoted the development of cereal chemistry as a profession, and contributed to the understanding of the science through extensive research and publishing. The six are:

M. J. BLISH, Phoenix, Arizona: member since 1922, president 1923-25; editor-in-chief of CEREAL CHEMISTRY 1938-43; Osborne Medal recipient, 1936.

C. N. FREY, Scarsdale, N.Y.: member since 1927, president 1941-42; winner, Babcock and Appert awards; now lecturer in Food Technology, M.I.T.

D. W. KENT-JONES, London, England: director Kent-Jones and Amos Laboratories; author of two widely known books in constant use; designer of Kent-Jones and Martin Flour Color Grader.

RALPH K. LARMOUR, Maple Leaf Milling Co., Toronto, Ontario, Canada: member since 1928; served

on numerous AACC committees; noted for service to Canada in many capacities.

RALPH W. MITCHELL, Evanston, Ill.: charter member; president 1919-21; compiled first AACC history; now lecturer, American Institute of Baking.

R. C. SHERWOOD, Jackson Heights, N.Y.: member since 1923; president 1933-34; managing editor of CEREAL CHEMISTRY 1927-31. With Sterwin Chemicals, Inc., for a number of years.

Medal Presentation and Address

The Thomas Burr Osborne Medal Award Committee unanimously selected Majel M. MacMasters as 1961 recipient, for her extensive and outstanding work. Thomas J. Schoch, Corn Products Co., will speak "Concerning the Medalist and Her Accomplishments." After the presentation Dr. MacMasters will address the members and guests on her subject, "Implications of Kernel Structure."

Exhibits

Members looking over the excellent exhibits will see a number of new items among them. Two of special interest are the display of the Baker Process Co. and the "Laboratory on Wheels" of the American Machine & Foundry Co. (illustrated in the March 1961 issue of CEREAL SCIENCE TODAY, page 81). Both of these are shown in conjunction with the program session on the continuous breadmaking process; heard and seen, all should be of considerable interest. Other exhibits of instruments and equipment are being shown by C. W. Brabender, Coleman Instruments, and Coulter Industrial Sales. Food items and chemicals will be well represented and demonstrated by Eastman Chemical, Food Industries, Fries & Fries, Merck & Co., Chas Pfizer & Co., Sterwin Chemicals, and United Salt Corp. Encyclopedia Britannica's exhibit will be of interest to everyone.

Barbecue and Rodeo

You have the rare opportunity of seeing a real Texas-style, private rodeo and enjoying a genuine Texas barbecue at a dude ranch outside of Dallas—something you'll not want to miss. On Monday, buses will leave the Baker Hotel at 5:30 p.m. for the Austin Ranch, about a 30-minute ride.. Awaiting you there are an enthusiastic welcome, a hearty feast prepared over the barbecue pit, and plenty of thrills in the rodeo put on for your special entertainment. The return trip will deliver guests at the hotel about 11 p.m. Put this down in your memorandum with a big "YES"!

Local Arrangements

Chosen for its commodious, comfortable, and attractive convention facilities, the Baker Hotel and its hospitality will please conventioneers. Both technical sessions and social events will be well accommodated. All sessions are concurrent, and each has a break for five minutes of relaxation "between halves." The time schedule has been carefully planned and will be adhered to without exception.

Lone Star Section hosts have provided for *advance registration* to eliminate any unnecessary delays in the operation. Even if you are not sure you will attend, send in the advance registration card. DO NOT SEND ANY MONEY. Your co-operation in the registration procedure will help the Local Arrangements Committee provide you with a smooth-running convention. Send your registration card to: George E. Tate, P.O. Box 180, Wichita Falls, Texas.

Starch Damage

FROM PAGE 112

commercial bakeries. The optimum amount of starch damage in many flours may at present be exceeded, or may vary widely enough to influence product uniformity adversely. The various milling companies are in the best position to determine whether or not this is true for their particular mills and flours.

Acknowledgment

The authors are indebted to G. A. H. Elton, British Baking Industries Research Association, for his helpful comments during the preparation of this paper.

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British Flour Millers

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duce the traditional flavor of porridge, and 11) the air-classification of flour to give fractions of widely different protein content. This last is a recent development with important commercial possibilities, and several mills have already installed the necessary equipment.

American Association of Cereal Chemists

OFFICIAL REPORT FOR 1960

ANNUAL REPORT OF THE TREASURER, 1960

The 1960 financial report of the American Association of Cereal Chemists is herewith presented. It is the pleasure of the treasurer to report an increase in assets of $6,343.85. The downward trend of the Association's position was checked last year, but the 1960 assets exceed that amount by $2,477.14. Our Association is in a sound financial position, but to remain so, it is imperative that we concentrate on increasing our membership. This is the only solid way of keeping our Association in the black. We have an active membership of 1,170 (a gain of 67), 48 sustaining, and 60 corporate members.

CEREAL SCIENCE TODAY is in a good financial position. While it has not as yet reached a break-even point, the operating deficit has been decreased by $3,021.13. The outlook for CEREAL SCIENCE TODAY is excellent.

It is quite apparent that our Association is in a very good financial position, and with the cooperation of all the membership, we shall endeavor to hold this position.

Respectfully submitted,

MARJORIE A. HOWE, *Treasurer*

Results of Operations, 1960

Income:		
Memberships	$21,942.00	
Subscriptions	16,053.82	
Advertising	15,945.07	
Reprints	3,782.87	
Back issues	1,498.35	
Interest	493.30	
Annual meeting and exhibits	13,165.91	
Special services	4,630.28	
Miscellaneous AACC	1,735.85	
Miscellaneous publications	210.87	
Decennial Index	105.80	
Monograph Vol. I	129.02	
Monograph Vol. II	493.87	
CEREAL LABORATORY METHODS	1,511.24	
Total Income		$81,698.25
Expenses:		
Printing, engraving, and postage	$34,599.70	
General administration	25,001.62	
Annual meeting (Headquarters only)	5,263.64	
Special services	3,001.15	
Monograph Vol. II	17.60	
CEREAL LABORATORY METHODS	67.46	
Depreciation	572.22	
Decennial Index	100.00	
Misellaneous AACC	2,308.53	
Miscellaneous publications	1,002.34	
Insurance and pensions	812.51	
Officers' travel	946.83	
FICA tax payments (including accounts payable—$67.77	411.60	
Bad debts and discounts	61.46	
Total Expenses		$74,166.66

Association assets, December 31, 1959		$19,989.69
Increase in assets, 1960	$7,531.59	
Reduction in Monograph inventory:		
50 books sold at $4.70;		
35 books lost at $4.70 $446.50		
Reduction in CLM inventory:		
133 books sold at $5.22		
9 books lost at $5.22 $741.24	1,187.74	
Increase in assets		6,343.85
Association assets, December 31, 1960		$26,333.54

Distribution of Surplus to Activities 1960 Books

Publications:		
Assets, December 31, 1959 (red)	($3,346.06)	
Income 1960 $52,025.98		
Expenses 1960 51,306.52		
Operating surplus	719.46	
Assets, December 31, 1960 (red)		($2,626.60)
Association:		
Assets, December 31, 1959	9,439.66	
Income 1960 $27,432.34		
Expenses 1960 22,749.18		
Operating surplus	4,683.16	
Assets, December 31, 1960		14,122.82
Monograph, Vol. I		
Assets, December 31, 1959	873.06	
Income 1960 $129.02		
Expenses 1960 4.90		
Operating surplus	124.12	
Assets, December 31, 1960		997.18
Monograph, Vol. II		
Assets, December 31, 1959	2,207.99	
Income 1960 $493.87		
Expenses 1960 28.79		
Operating surplus	465.08	
Inventory, Dec. 31, 1959 (95 books at $4.70) $446.50		
Inventory, Dec. 31, 1960 None		
Decrease in assets—inventory reduction	446.50	
Assets, December 31, 1960		2,226.57
Decennial Index:		
Assets, December 31, 1959	$771.07	
Income 1960 $ 5.80		
Allocation 1960 100.00		
	105.80	
Assets, December 31, 1960		$876.87
CEREAL LABORATORY METHODS:		
Assets, December 31, 1959	10,043.97	
Income 1960 1,511.24		
Expenses 1960 77.27		
Operating surplus	1,433.97	
Inventory, Dec. 31, 1959 (426 books at $5.22) 2,223.72		
Inventory, Dec. 31, 1960 (284 books at $5.22) 1,482.48		
Decrease in assets	741.24	
Assets, December 31, 1960		10,736.70
TOTAL ASSETS, DECEMBER 31, 1960		$26,333.54

Assets and Liabilities, December 31, 1960

Cash on hand:		
Checking account	$24,440.69	
Petty cash	274.19	
Savings account	15,612.30	
		$40,327.18

Current liabilities:		
Balance due on Federal taxes	$ 324.48	
FICA taxes — accounts payable	67.77	
Dues received in advance	16,206.00	
Subscriptions received in advance	9,152.15	
Exhibits, Dallas	1,275.00	
Sanitation series, 1961 income	275.00	
		27,300.40
Cash position (black)		13,026.78
Assets:		
Accounts receivable (1960)	$2,674.28	
Series G bonds	4,000.00	
Equipment	5,150.00	
CLM inventory	1,482.48	
		13,306.76
Association assets, December 31, 1960		$26,333.54

Auditor's Report

I have examined the attached statement of financial position of the American Association of Cereal Chemists as of December 31, 1960, and the related statements of operations and surplus for the year then ended. The examination was made in accordance with generally accepted auditing standards.

In my opinion the attached statements are substantially accurate and present fairly the position of the Association as of December 31, 1960. The safeguarding of Association assets, including proper maintenance of accounting controls, is considered adequate.

JOHN D. POWELL, *accountant*

Report of the Editor of CEREAL CHEMISTRY

The six issues of CEREAL CHEMISTRY published in 1960 (Vol. 37) contained 792 pages, comprising 85 research papers. The 1959 issue consisted of 580 pages, containing 52 research papers. Therefore, in 1960 a 37% increase in volume over 1959 was effected.

A total of 90 manuscripts were received in 1960; of these, 13 have been published (an increase of 85% over 1959), and 35 have been accepted and are awaiting publication. Four manuscripts have been withdrawn or rejected and 38 are under review.

The large backlog of manuscripts that had accumulated at the end of 1959 and continued to increase during the early part of 1960 has now been reduced to manageable proportions. Manuscripts are being reviewed, revised and accepted in a period of two to six months. In view of the fact that CEREAL CHEMISTRY is published only every other month, this is a normal schedule. Actual publication takes place from four to six months after acceptance.

Two Editorial Board members, B. Marlo Dirks and Byron Miller, retired on January 2. One new Editorial Board member, Karl Finney, has assumed his duties.

Following the untimely death of William F. Geddes, the Board of Directors appointed a new Editor. Dr. Geddes served the association for the past eighteen years; he was the fourth Editor of CEREAL CHEMISTRY since its establishment in 1924.

K. A. GILLES, *Editor*

Report of the Editor of CEREAL SCIENCE TODAY

No report of an editor can successfully contradict the record provided by the publication itself. On it our efforts must be judged. With this issue, CEREAL SCIENCE TODAY completes five years (fifty issues) of publication. Though changes in content and format have been made, and further improvements may be expected in the future, the basic concept with which the journal was launched in May 1956 has proven sound and has been adhered to.

It has been the editor's goal to provide a publication to best serve the individual members of the AACC. In part this has been done by providing information useful to the cereal chemist, and in part by explaining his work and functions to others.

With the fine cooperation extended to him by others, the editor's task of obtaining an adequate supply of publishable material has become progressively easier. Suggestions are always welcomed.

P. E. RAMSTAD, *Editor*

Report of the Executive Secretary

As the Treasurer has pointed out, 1960 was a most successful year from a financial standpoint. This success is due in large measure to the continuing importance and acceptance of the AACC's publications. CEREAL CHEMISTRY continues to show an increase in circulation. There can be no argument that this major journal of the AACC is the world's authority in its field.

CEREAL SCIENCE TODAY, the Association's popular new journal, is proving to be one of the most outstanding publications of its kind in the field. Through the efforts of its Editor, Paul E. Ramstad, it is gaining an international reputation among scientists as well as members of management, sales, and service. Advertising, the backbone of CST's financial support, is improving yearly. However, its growth is not yet sufficient to completely cover production costs. Advertisers are becoming aware of CST's important role in the cereal industry. But only through the concentrated efforts of AACC members will the journal obtain adequate financial support to provide its readers with the many services envisioned when the journal was first established in May of 1956.

I cannot stress too strongly the need for membership support in this area. Whenever you have the occasion to write to a particular supplier regarding a product that was advertised in CST, please mention that you saw his ad in the journal. If such requests are normally channeled through the purchasing department in your company, then by all means tell the representative of the supplier when he calls on you that you read his advertising in CST, and, what is even more important, let a supplier know that you do *not* notice his ads appearing in CST, and that you read CST regularly. Action of this type on your part is the only way the advertiser is going to know that CST represents an important medium for him to be represented in.

Suppliers spend considerable money in having their representatives call upon technical people in the cereal industry. It would seem only logical that this represents an opinion by the supplier that the technical man is important, directly or indirectly, to the ultimate sale of his product in a particular company. I am not suggesting nor urging brow-beating, arm twisting, nor the like. What I am asking and urging is that you let your suppliers know the important role played by CST in your regular reading. Once the sup-

plier knows this, then our job of selling space is more than half won.

Members will be interested in learning that Monograph II, the *Storage of Cereal Grains and Their Products,* has been completely sold out. Due to the many inquiries regarding reprinting of this edition, the Board of Directors is considering a proposal from a commercial publisher who is able to supply single reprint copies on request. A further report on this project will be made during the business meeting in Dallas.

While copies of the 6th edition of *Cereal Laboratory Methods* are still available, the supply is diminishing at a rapid rate. Work on the 7th edition of CLM is progressing nicely as a report of the revisions committee will indicate. It is hoped that by midsummer a complete manuscript for a large number of the sections of the book will be available for editing. As has been reported elsewhere, the 7th edition of CLM will be looseleaf. This will enable the AACC to offer its users the most up-to-date methods available on a regular and continuing basis. An additional report from your Executive Secretary will be made during the business meeting on this subject.

Once again I would like to bring to the attention of AACC members a very worn cliche, but nevertheless, a very true one. The Association is what you want it to be. Only by letting us know what you like and even more, what you dislike, can we provide the services of most benefit to you. There is nothing your Executive Secretary appreciates more than receiving a letter from you on some program or activity of the Association that you have a particular interest in and an opinion on. As humans, we all like to receive bouquets if bouquets are called for. However, if there are just criticisms to be made and suggestions that you have to offer that can be incorporated into our operations, we are equally as grateful for your letters. Our task is to serve you, but to do this intelligently, we must have your guidance.

R. J. TARLETON,
Executive Secretary

Employment

At the present time, the Committee files list three applicants and twelve openings. This ratio between cereal chemists seeking new connections and available positions has maintained itself during 1960.

Some employers in large organizations have requested that their names be kept on the Committee list, with the thought in mind of building up a backlog of man-power.

It is indeed a very healthy situation for the cereal chemist. How different from the early years when a mill chemist was considered a necessary evil with little or no recognition beyond the confiines of his one-man laboratory.

Are you satisfied with your present situation? Why not write the Employment Committee? You might be surprised.

ROWLAND J. CLARK, *Chairman*

Membership Recruitment

The major goal of this committee for 1960 was the follow-up of the excellent membership survey coordinated by last year's chairman, Donald B. Davis. All Local Sections of the AACC cooperated in supplying the names and addresses of potential members to the Membership Recruitment Committee. The list, when assembled, numbered approximately 500 individuals. To this basic list, was added approximately 150 names of nonmember registrants at the Chicago meeting. This committee's task, therefore, was to invite each of these individuals to join the AACC offering them sound arguments why such a membership was desirable and even essential for their professional advancement.

The committee used basically a program of direct mail with a follow-up by special committees set up in each Local Section. Three letters of invitation were sent at periods of approximately 6 weeks to the individuals on the two lists. Each letter pointed out a different phase of the AACC's services and offered sound reasons why these services were of benefit to the prospective member. The special membership committees in each of the Local Sections followed up these direct mail appeals by personal contact.

Since May of 1960, 129 active members and 9 sustaining members have joined the AACC. Of this number, 96 have been enrolled as 1961 members. Final figures will be reported at the business session during the 46th Annual Meeting in Dallas.

Regardless of how active a recruiting campaign a membership committee engages in, its ultimate success depends upon the support given by each and every member of the Association. The best salesman for the AACC is an active member himself. If each of us were to contact and sell only one of our colleagues who is not now a member of the AACC, our ultimate goal of representing all cereal chemists in the industry would be accomplished in short order. There would then be no need for a Recruitment Committee.

LYLE P. CARMONY, *Chairman*

Monograph III

Work on the Monograph is progressing steadily through its various stages. During the past year ample time has been allowed for completion of chapter assignments. More than half of the chapters have been drafted and others are still in preparation. Effort will be made to round-up the chapters during the calendar year.

I. HLYNKA, *Chairman*

Nominating

Section chairmen as well as past presidents were contacted in August for names of candidates for the offices of President-Elect, Secretary, and member of Board of Directors. The following number of names were received for each post: president-elect, 27; secretary, 24; board member, 32. From this group, the Nominating Committee selected the candidates for the nominating ballot.

W. H. ZIEMKE, *Chairman*

Publicity

The activities of this committee followed the very successful routine set up by its predecessor under the chairmanship of William Simcox. The major effort was directed at the trade press. Press releases mailed at varying intervals prior to the Annual Meeting emphasized the various aspects of the program. Local arrangements was the subject of one release; the techni-

cal program was the subject of another; the guest speakers on the opening session another. A press room was set up near the meeting rooms and afforded the members of the press covering the convention an opportunity to prepare their stories and gather additional information from special releases prepared during the meeting. A successful press conference was conducted at the end of the first day's technical sessions. The chairman would like to especially thank George E. Swarbreck, the Editor of the NORTHWESTERN MILLER, for his help as a member of the Publicity Committee.

RICHARD HALE, *Chairman*

Revision of By-Laws

In accordance with a request from the President and Board of Directors, the By-Laws Revision Committee drafted proposals for amendments which have been mailed to the membership and will be voted on at the annual meeting in Dallas, April 13, 1961.

R. C. SHERWOOD, *Chairman*

Thomas Burr Osborne Medal Award

The Thomas Burr Osborne Medal Award Committee, by unanimous decision, selected Dr. Majel M. MacMasters as the eleventh recipient of the Thomas Burr Osborne Medal. The presentation will be made at the annual meeting in Dallas, April 10, 1961.

BETTY SULLIVAN, *Chairman*

TECHNICAL COMMITTEES

The 1960-61 work followed the pattern established in 1959-60 leading to the development and completion of methods for *Cereal Laboratory Methods,* 7th ed. Most of the committees have reported, and their reports or a summary of their activities are given below. A Report to the Board of Directors was made at its meeting in January, 1961.

I call particular attention to the work of the Physical Testing Methods Committee *(Cereal Science Today 6:* 41; 1961), and to the Herculean teaching task of sample analysis and review performed by the Sanitation Methods Committee.

My resignation as Chairman of the Technical Policy Committee will take effect at the close of business at the Dallas Meeting.

My sincere thanks to all of the Technical Committee members, and to Miss Edith Christensen, the new Chairman, Good luck!

BRAN IN FLOUR, *Wilbur L. Deatherage:* No report.

BREAD STALING, *Lloyd B. Crossland:* The 1960 report of this committee consisted of First Approval for a new firmness method for CLM, which has been sent to the Methods Revision Committee.

CAKE FLOUR COMMITTEE, *Harry Miller:* No 1961 report at this time.

CHEMICAL LEAVENING AGENTS, *Richard D. Haynes:* No 1961 report at this time.

COLOR MEASUREMENT, *Archer C. Wilcox:* No report.

COOKIE FLOUR, *Grant W. Pearcy and H. W. Putnam:* This committee was reorganized during 1960. A general meeting was held in Indianapolis to plot its course for the year. A plan for action included a large questionnaire to be sent to anyone interested in cookies. From the returns from the questionnaire the Cookie-Baking Performance Test was rewritten for publication in CLM. In addition, the questionnaire pointed out several problem areas in which future committees could profitably spend time.

CRACKER FLOUR, *Jan Micka:* No 1961 report at the present time. Consideration is being given by the Chairman of the Technical Policy Committee to reorganization of this committee and establishment of a subcommittee to organize a group to establish relationships between laboratory analyses and production characteristics.

DEFINITION OF TERMS, *Clinton L. Brooke:* This committee has reported orally, and is active. No report available at this time.

ENZYME ASSAY, *Leland Underkofler:* This committee reported in detail in 1960 and has continued to survey for methods. No 1961 report at this time.

EXPERIMENTAL MILLING, *Robert K. Bequette:* This committee was reorganized during 1960 and there is no 1961 report at this time.

FAT ACIDITY, *Robert L. Glass:* The work of this committee consisted of several collaborative tests run on samples of wheat and corn. The results of these tests are being translated into methods for CLM and will be sent to the Methods Revision Committee.

FLOUR PARTICLE SIZE, *Paul R. Crowley:* The report appeared in the February, 1961, issue of CEREAL SCIENCE TODAY.

FLOUR SPECIFICATIONS AND APPROVED METHODS, *William F. Ziemke:* An interim committee report on this subject appeared in the October, 1960, issue of CEREAL SCIENCE TODAY. Following this report a new chairman was appointed and the committee was reorganized. No 1961 report is available at this time.

MACARONI PRODUCTS ANALYSIS, *Leonard D. Sibbitt:* Methods work now being completed is not yet ready for reporting at this time.

MICROORGANISMS IN CEREAL PRODUCTS, *Clyde M. Christensen:* The 1960 report consisted of an extensive series of methods which have been sent to the Methods Revision Committee. There are no new methods to report at this time. The scope of the work of this committee is being evaluated.

MINERAL ANALYSIS OF FEEDSTUFFS, *Edward E. Chapman:* A survey was made of people using methods as they now appear in current methods books (AACC, AOAC, etc.) and the methods were adapted to CLM. These methods have been sent to the Methods Revision Committee.

NATIONAL CHECK SAMPLE SERVICE, *L. H. Fischer:* The Check Sample Committee reports regularly to participants in the various check sample services. No further report is to be made at this time.

ORGANIC ACID ANALYSIS, *Clifford A. Watson:* An extensive set of methods was submitted as part of the 1960 report. No report at this time.

OXIDIZING AND BLEACHING AGENTS, *Meade C. Harris:* A report of the Oxidizing and Bleaching Agents Analysis Committee was made in May, 1960. It consists of the revision of CLM and the study of a new method for calcium peroxide. No further changes are being made at this time.

PESTICIDE RESIDUES, *Warren O. Edmonds:* Methods submitted at the 1960 annual meeting as "First Action" are now being recommended as "Final Action."

PHYSICAL TESTING METHODS, *William C. Shuey:* The work of this committee is culminating in a program for mixer certification. The certification program has been reported in CEREAL SCIENCE TODAY, February, 1961, issue.

PROPERTIES OF EDIBLE FATS, *Donald C. Meek:* During 1960 three committees (Prepared Baking Mix Analysis, Hydrolytic Rancidity of Fats, and Plasticity of Fats and Emulsifiers) were terminated and the present committee was established on a stand-by basis so that this Association would be made aware of developments that warranted its attention. This committee continued on this basis.

PROXIMATE ANALYSIS OF CEREALS, *Paul J. Mattern:* New methods and/or changes were sent to the Methods Revision Committee early in February, 1961.

PROXIMATE ANALYSIS OF FEEDSTUFFS, *Gerald D. Miller:* No report.

RATE OF HYDRATION OF POWDERED MILK, *David E. Downs:* The previous committee, 1959-60, has made suggestions on changes in CLM. The committee was reorganized during 1960 and the present committee has not been active in methods development work.

REVISION OF CEREAL LABORATORY METHODS, *Majel MacMasters:* The committee has reported directly to the Board of Directors at their January meeting.

SAMPLING OF CEREAL PRODUCTS, *M. H. Neustadt:* The 1961 report consists of methods recommendations which have been forwarded to the Methods Revision Committee.

SANITATION METHODS, *O'Dean L. Kurtz:* The major activities of this committee have been in the training work on insect fragment recognition and identification. This work is reported periodically to the individual participants in the Training Service. A separate project has dealt with the methods development work. Recommendations on these methods will be made shortly.

SEDIMENTATION TESTS, *Walter T. Greenaway:* As in previous years, two sets of samples consisting of four different wheats or flours were prepared on the Beltsville Western rolls from wheat and were sent to 25 members of the committee. The samples were tested by the method described in the 6th edition of CLM and the results sent back to the chairman, who summarized them into statistical reports, a copy of which was sent to each collaborator and to others who had indicated an interest in the test. The committee knows that it can achieve a precision of 1.5 ml. standard deviation from the mean from those possessing cylinder shakers. The over-all results this year have not been quite so good. However, it has been observed that usually when there was a serious difference in a result, it was due to some simple oversight. A more extensive report is being prepared for the open committee meeting in Dallas and copies will be available at that time.

SOYBEAN ANALYSIS, *Endre Sipos:* A new chairman was appointed in 1960 and the committee is being reorganized. The present chairman reports a good response to the committee reorganization, and a new basis for action is to revolve around the following key points: 1) As a matter of broad policy, close liaison should be maintained with the biochemist methods committee of the AOCS. Duplication of method development should be avoided. The development and adoption of new methods should be considered only if there is a specific application to cereal chemistry. 2) With regard to common analyses such as moisture, protein, sand, ash, crude fiber, etc., it is recommended that this committee review the cereal chemists' methods to determine their correlation with the corresponding AOCS, AOAC, and ASTM methods. 3) The urease method does not merit further investigation because it does not apply to the field of cereal products. On the other hand, the committee probably should look into methods hitherto not considered, such as color, bacteriological tests, etc. It has been pointed out that there is a need for evaluation of the changes which take place in soybean protein during storage of the beans. 4) It was generally agreed that there was a need for a standardized Nitrogen Solubility Index method. This, naturally, sets the stage for developing a standardized NSI method as the most likely project for the Soybean Analysis Committee. Since an AOCS subcommittee can be set up for water-dispersible protein, consultation with AOCS is in order. This will be discussed at the Dallas meeting.

STARCH AND PENTOSAN, *Walter S. Hale:* The current work of this committee consists of the methods which have been sent to the Methods Revision Committee. No further comment at this time.

STATISTICS AND EXPERIMENTAL ERROR, *John P. Woolcott:* A new chairman was appointed in 1960, and the committee is now undergoing an organized expansion. During the past year, the committee has discussed the revision of Section 87.0 in CLM. Since a definite recommendation has not yet been devised concerning this section, no change is suggested for the new edition. The primary task before the chairman has been the development of a committee which will continue to discuss this matter. The second purpose of the committee is the investigation of the contents of, and the undertaking of, an appraisal of Section 29.0, Experimental Errors. A third purpose of the committee is dissemination of statistical information to the membership. Plans are being made for a statistical symposium to be held as part of, or after, the 1962 annual meeting. Suggestions on the agenda of such a session are welcomed by the chairman.

SUGAR ANALYSIS, *R. J. Dimler:* No report.

TEST BAKING, *Henry Solle:* The Test Baking Committee has completed the revision of Method 11.2 c, "Baking quality of bread flour: wheat-sponge dough, pound-loaf method" and has submitted the revision to the Methods Revision Committee. The committee is available to the Association for the purpose of work in the area of test baking.

VITAL GLUTEN TEST METHODS, *Walter A. Carlson:* A final report was submitted at the 1960 annual meeting. The committee is satisfied that the methods recommended at that time should be submitted as final methods. There is no further report.

VITAMIN AND MINERAL ANALYSIS, *Welker G. Bechtel:* This committee reviewed methods of vitamin analysis and approved new methods of analysis for the following vitamins for the 7th edition of CLM: ascorbic acid, vitamin A and carotene, vitamin B_6, niacin, vitamin B_{12}, riboflavin, and thiamine. The new method has

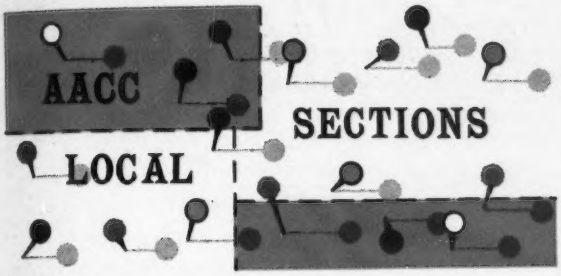
been submitted to the Methods Revision Committee.

The other activity of the committee was to continue collaborative tests of the riboflavin procedure which has been under study during the past four years. Results of the collaborative tests will be discussed at the committee meeting at Dallas on April 12.

YEAST-LEAVENED FLAVOR, *Simon S. Jackel:* This committee is now being organized.

YEAST-RAISED PRODUCTS, *David E. Downs:* This committee will have no report this year. The committee has been on a stand-by basis to check suggestions for improvement of the methods for testing sweet-dough products which was approved last year. There have been no comments indicating dissatisfaction with the method as previously covered in CEREAL SCIENCE TODAY.

KENTON L. HARRIS, *Chairman*
Technical Policy Committee



Central States Section sponsored the second annual ingredient symposium, held January 27 and 28 at the Northern Utilization Research and Development Division, Peoria, Ill. Nearly 150 cereal chemists were present, from both the east and west coasts as well as near-by states. In the photo, M. J. Wolf of the NURDD

describes work on wheat and flour microscopy at Peoria. Major topics discussed at the meeting were: Proteins, by James W. Pence, Western Regional Research Laboratory; Carbohydrates, by R. M. Sandstedt, Univ. of Nebraska; Lipids, by K. A. Gilles, North Dakota State Univ.; Enzymes, by Byron S. Miller, Kansas State Univ.; and Evaluation techniques for soft wheat flour, by William Yamazaki, Soft Red Winter Wheat Quality Laboratory, Wooster, Ohio. A panel session followed. Registrants toured the Laboratory before the technical sessions began.

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Chesapeake Section's speaker and trio of illustrated subjects for the February 23rd meeting: Joan M. Griffin, Chas. Pfizer & Co., Inc. — The use of sorbic acid and potassium sorbate as antimycotic agents (fungicides) in bakery products; the use of Gluconо-Delta-Lactone as an ingredient in leavening formulations; and lysine supplementation to improve the amino acid balance for better digestion of wheat products. Mrs. Griffin has been with Pfizer for the past ten years as biochemist in fermentation and experimental baking.

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New York Section's speaker at the February dinner meeting, Dr. Ernest Guenther of Fritzsche Bros., discussed methods of production and extraction of various essential oils and the use and application of these aromatic substances by the food industry and others. He showed a color film describing his trip to various countries in South America, where he personally investigated the production of essential oils in many areas, some of them isolated, and often under hazardous conditions. Dr. Guenther emphasized the importance of establishing a convenient source of supply among producers of essential oils in South America, not only for its strategic value to the U.S., but also to assist materially in the economic development of those countries.

For the March meeting (14th) Franklin M. Depew, president, Food Law Institute, Inc., dealt with current developments in food legislation in his talk, "Food additives — where are we now?"

New member: E. Everett MacDonough of Sterwin Chemicals, Inc.

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Northern California Section's February meeting (21st) was held at Henry's Fashion Restaurant, San Francisco; social gathering at 6 p.m., dinner at 7. James W. Evans, AACC president-elect, was guest and speaker.

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Lone Star Section's February meeting at the Baker Hotel, Dallas, spanned Friday evening (24th) with a bull session in the English Room, and Saturday until midafternoon. The forenoon formal program presented Leslie Pritchett of Mrs. Baird's Bakeries, speaking on "Science and sales"; R. H. Johnson and Delyle Kinman of R. T. Vanderbilt Co., "Emulsifiers in cake and bread"; and C. J. Harrer, Anderson Clayton & Co., "Specialization of shortening functions." Discussion and questions followed until noon luncheon. The period from 1:30 until adjournment at 3:30 was given over to discussion and planning for the National Convention, April 9-13, to which this section is host.

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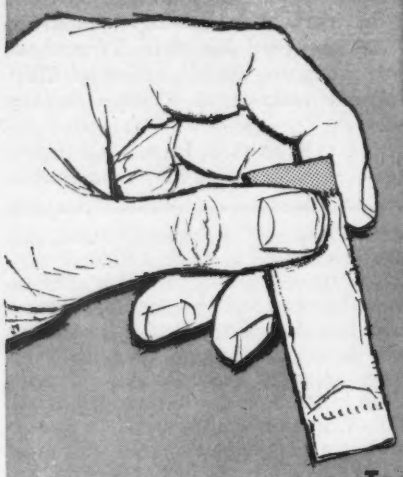
Kansas City-Pioneer-Nebraska Sections met on February 24 and 25 at Hotel Phillips, Kansas City, Mo. On Friday evening, informal cocktail hour opened at 6; following dinner, individual sections met for election of officers. General subject for Saturday morning's program was "Continuous mixing of doughs." Speakers and individual subjects were: K. L. Fortmann, Baker Process Co. — "Checking flour for continuous mix bread production"; George W. Trum, American Machine & Foundry Co. — "The use of the laboratory continuous mixer as a new tool"; and J. M. Doty, Doty Laboratories, North Kansas City, Mo. — "Laboratory continuous mixer evaluation of commercial flour."

New officers of Kansas City Section: chairman, Edward E. Chapman, Doty Laboratories, North Kansas City, Mo.; vice-chairman, Walter W. Cochran, Wallace & Tiernan, Kansas City, Mo.; secretary-treasurer, John C. Halverson, Commander-Larabee Milling Co., North Kansas City, Mo.



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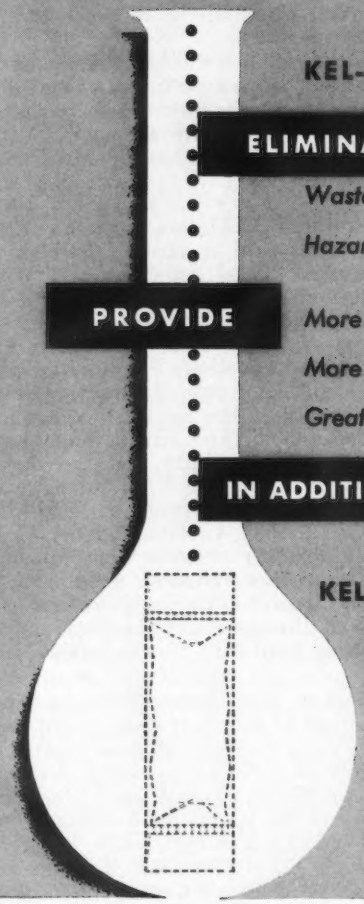

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X-Ray Training and Check Program

By O'Dean L. Kurtz

Chairman, AACC Sanitation Committee

ONE OF THE most recent developments for detection of internal infestation in cereal grains is the X-Ray-Radiographic Technique. The X-Ray method is an absolute test which can provide the information necessary to identify and grade cereal grains rapidly on the basis of internal infestation.

The Sanitation Methods Committee of the American Association of Cereal Chemists announces its X-Ray Training and Check Program for internal insect infestation, beginning April 1961.

Like the current Insect Fragment Training Series, the X-Ray program will be another "personalized" activity of the Sanitation Committee and another service feature of the AACC, open to members and nonmembers alike.

Through a plan of training and technical review, the program will emphasize the standardization of X-Ray technique and a technical proficiency in radiographic interpretation.

You will appreciate the time required to achieve success in a program of this type. Our current Insect Fragment Training Series has been in effect one year and has required from 50 to 75 man hours each quarter by members of the Sanitation Committee. In view of this, we must seriously limit the participation to 35. Registration will be accepted at any time until this enrollment is reached. We urge, however, that you sign up now and begin on schedule as outlined below. This will help to expedite the program and will permit each participant to receive maximum benefit.

The program provides three categories of activity:

1. Standardization of X-ray techniques and the recognition of typical internal damage. Special directions for development of the radiograph will accompany the first sample. The first three wheat samples will provide the various stages of weevil infestation. Each sample will demonstrate a different stage of infestation—egg plug and incipient larval tunnel, early to late larval stage, pupal and exit hole stage. Directions for reading the radiographs will be provided. Radiographs will be sent to reviewers of the sanitation committee and will be returned to the participant with comment if necessary. These three basic training samples will be issued in April, May, and June.

2. The second category will involve the interpretation of radiographs prepared by the Sanitation Committee and based on the basic training acquired from category 1. Each radiograph will demonstrate different levels (counts) and stages of weevil infestation. Directions will be provided. The radiographs will be sent to the reviewers and returned to participants with comments if necessary. The first of the second category will be issued in May and every other month thereafter (July, September, November).

3. The third category will be purely a check sample without review. Radiographs, similar to those received in the second category above, will be issued to each participant in August, October, and December.

All radiographs will be identical. The results of all participants will be tabulated along with those of the board of reviewers. A mimeographed copy of the results will be received by each participant for comparison.

If you are interested, please fill out and mail the registration form below.

TO: American Association of Cereal Chemists
1955 University Ave., St. Paul 4, Minn. — Attn.: X-Ray Training and Check Program

Please enroll me in the AACC's 1961 X-Ray Training and Check Program Series. I understand the first sample will be sent out in April, with additional samples as indicated. I am—am not (circle one) an AACC member. My check is enclosed in the amount of $_____
(Fee: $25 members, $50 nonmembers.)

NAME_____
Address to which samples are to be mailed

ADDRESS_____
Please print or type

EMPLOYED BY_____

Civil defense training can save lives and property in time of

Natural Disasters

THE CIVIL DEFENSE training course, while organized primarily as civilian preparedness in case of war, can serve you in the alleviation of suffering and hunger, and the speeding up of recovery from natural disasters. In many ways the problems created by natural disaster may be similar to those of a civilian population exposed to the ravages of war and the greatest variation is chiefly in degree. Even that might not be too great compared to the devastating hurricanes that periodically sweep our Eastern coast, the destructive tornadoes of the mainland, and the ravaging floods in our river valleys.

Some points of similarity between natural disaster and undeclared war (Pearl Harbor may have ended the formal declaration of wars) are:

1. Catastrophe is usually spread over a wide area affecting a large number of people and plant facilities with little or perhaps no warning.
2. Many people are driven from their homes with personal belongings consisting only of the clothes on their backs and possibly the family automobile. Similarly plants are inundated or wrecked. The usual supply of water (power, etc.) is cut off or greatly reduced, and—
3. Hazards may continue in the affected areas from contaminated foods and drugs, wrecked buildings, blocked highways, lack of medical care, supplies, etc. for a considerable period of time.
4. The local government, even if operable, may be overwhelmed with the disaster conditions and have to call for outside help by State and Federal authorities and depend on *your judgment* as to what should be done.
5. Recovery to normal will be slow and prepositioned emergency operating plans must be effected.
6. There will be shortages of the bare necessities of life for many displaced people, including children and babies.
7. Variation in weather conditions ordinarily almost unnoticed, can cause untold hardship and suffering following a disaster.
8. Business cannot be carried on as usual between distress and normal areas.
9. Adequate warning of impending disaster and predisaster planning can save many lives and much property, including essential survival food and drug items and get you back in operation faster.

Natural disaster, such as fire, can come without warning. The Southern Railway Company warehouse in Charlotte, N. C., a large wood structure, approximately 300 by 600 feet in area, with railroad cars on tracks in its center, and unloading docks, warehouses and offices along its sides, became a mass of flames almost instantly at 4:00 p.m. on the afternoon of June 24, 1954. It was a calm day and the great cloud of smoke billowing into the sky was observed by people in Columbia, S. C., 75 miles away. Fears were even expressed that an atomic bomb might have been dropped on Charlotte. While fortunately there was no loss of life, women reported they had time only to grab their purses and run for their lives. Property destruction was total.

With our elaborate early warning system working properly, extending in all directions from our country, we can expect some warning time on any all-out missile attack with any type of weapon. While the time may be extremely short, if people were previously prepared and organized they could take shelter, and any shelter is better than nothing.

Dr. Teller, father of the H-Bomb, in a recent speech, predicted that 90% of our people could be saved with an adequate shelter system and 10 minutes of warning time. In the case of floods and hurricanes, people are usually given several hours warning time, but in case a big storage dam were to burst the people immediately below it, and for several miles down stream, would have virtually no warning time.

Identification of authorized personnel in natural disaster acreas was a particularly troublesome problem at the time of the great Kansas City flood and later Hurricane Hazel. Later, after the adoption of a nationally accepted civil defense identification card and automobile markers, authorized personnel could come and go practically at will in the disaster areas.

The psychological problems involved when sizable segments of population are suddenly uprooted, many from homes of a life time, are terrific. While in a natural disaster the casualties are very few compared to what we can expect in case of war, the same principles will apply. The basic necessities of life and even survival must be provided for the people as quickly as possible.

Every able-bodied person should be put to work and the people should be informed of the true conditions existing in their area of the country at regular intervals or as often as possible.

While we usually think of contamination during war as consisting principally of radioactive fallout particles, biological agents or toxic chemical agents, actually they

may be accompanied by the ordinary biological organisms, filth, and toxic chemicals which may have come from toxic substances being stored or shipped under normal peacetime law and regulations.

Decontamination Patterns

Decontamination of people, articles, and places following enemy attack may follow much the same pattern that decontamination of people, places, or things require following a natural disaster, except that more precaution must be given to the protection of the people doing the work and to the disposal of the removed contaminants in cleaning solutions and apparatus. During the Kansas City flood, hogs from a vaccine plant that had been inoculated with contagious diseases were swept away along with the plant. Frantic radio announcements were issued to all people living down stream to *not* butcher or eat any meat from hogs swept ashore by the flood. Apparently this method of reporting was successful since there were no reports of injuries to any people in the area where the hogs might have gone ashore.

While decontamination of containers is quite a problem, decontamination of their contents is a far more difficult one. In some cases it may not be as difficult to successfully decontaminate containers and their contents in wartime since peacetime standards may have to be lowered to prevent people dying from actual lack of food and drugs. Certain containers are almost impervious to outside agents, while others have seals or closures which are not sufficiently tight to prevent the entry of contaminating agents.

Emergency Government

Civil defense has long anticipated the possibility of breakdown of local government in hard-hit areas. Its National Plan for Civil Defense and Defense Mobilization, together with its Annexes and Appendices, will provide emergency plans of operation for all Federal Departments and agencies and will assist State and local governments in setting up emergency plans which will fit into one overall plan of civilian preparedness. In a natural disaster there is time for a disaster area to request aid from other local or State and Federal Governments. In a disaster resulting from war, anarchy and chaos veloped plans and organization which could be put in effect by a could result without previously de-Presidential Proclamation or some other triggering arrangement.

One of the most difficult and trying times in a natural disaster is the slow, hard, pull back to normal following the event. However, with a well organized civil defense, ready to step in with emergency funds and equipment and people trained in emergency operations, this time can be shortened and much of the discomfort and many of the hazards reduced. A tiny town in the State of Kansas, that was completely wiped out by a tornado, has been rebuilt with fallout shelters. It now advertises itself as the safest town in America. Lives lost in the natural disaster could have been saved had civil defense preparations been made before the storm. Tornado cellars (fallout shelters) and an adequate warning system would have saved the people. We must not wait to see if our Nation can survive a nuclear storm before deciding to do something about making our Nation the safest place on earth.

We are probably the most overfed and under-worked people on the face of the earth today. When we are faced with actual want for basic, bare necessities of life, food, shelter and clothing sufficient to sustain life, we can be very unhappy and down right miserable! People under these conditions will eat or drink foods and take medicines that could actually harm rather than benefit them. People in the food and drug field will have to inspect and segregate harmful food and drugs. They will decontaminate where possible, or safely destroy unsafe food and drug supplies. The same experience and training needed to perform such tasks in natural disasters, with some additional training, can prepare people to work equally well and effectively in a wartime emergency.

Early Warning

As mentioned earlier, one of the greatest keys to the saving of life and property in either a natural disaster or in war is the amount of warning time that can be provided. If the information received by the people and railroad companies during the Kansas City flood had accurately predicted the failure of the dikes along the Kaw River, over 2,000 railroad cars, most of them loaded, and thousands of loads of household furniture could have been moved to high, safer ground. Of course, in wartime it is unlikely that furniture or other bulky personal effects will be moved, but millions of people can be saved by going into their own home shelters. Tornado warnings permit people to go into storm caves and other places of safety. Warnings of nuclear, biological or chemical attack can save millions of people if those millions are properly trained in civil defense and have properly built and equipped shelters. Making the correct moves in the time of a disaster, with the least waste of time and effort, comes largely from adequate training and practice.

Our entire civil defense effort for either natural or wartime disaster may succeed or fail depending upon the amount of predisaster planning and training that has been done. While the success of any operation may be said to be accomplished in proportion to the preoperational planning and practice, in few instances is this more noticeable than in preparation for disasters. The so-called "hard" industries have made great progress in predisaster planning and scarcely a year goes by that the loss from some great natural disaster, often fire, is not reduced due to the preemergency planning of the affected plant officials and their neighboring industries.

A Way of Life

Civil defense then must become our way of life for as long as the danger exists and as long as hurricanes, tornadoes, fires and floods ravage our land. Emergency readiness and civil defense must become a natural and integral part of each employee's job activities. Civil defense is not to be ignored or unduly feared. It is the assumption of our responsibilities as individual citizens in the defense of our nation, our families and our lives. We will never know as much as we should about civil defense or operate as effectively and as quickly

(Please turn to page 132)

Manual of Microscopic Analysis of Feeding Stuffs (revised); published by American Association of Feed Microscopists, 1960. Price, $7.50. For copies, write G. M. Barnhart, Missouri Dept. of Agriculture, Jefferson City, Mo.

The revised Manual is printed on 6 by 9-inch looseleaf sheets, held in a ruggedly constructed binder with washable plastic cover, designed for in-laboratory use. Its 190 pages of valuable information are divided into four sections which cover Plant products; Animal, marine, and poultry products; Minerals and spot tests, and Methods. The ingredient sections include discussions of macroscopic, low-magnification, and histological features of each ingredient, as well as official definitions. The purchase price includes revision sheets which are to be supplied as methods are changed or improved.

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Lipide Metabolism, edited by Konrad Bloch. xiii + 411 pp.; ill. John Wiley & Sons, New York and London, 1960. Price, $10.50. Reviewed by O. W. WENDEL, Sterling-Winthrop Research Institute, Rensselaer, N. Y.

The resurgent interest in lipids has produced a need for a text which would bring the recent advances in the field to the attention of biochemists and others interested in keeping abreast of current problems. This book performs an admirable service by filling the gap which heretofore existed between Duell's compendium and the usual coverage afforded in basic textbooks of biochemistry.

Lipide Metabolism highlights the thinking of certain investigators concerned with (i) enzymatic mechanisms of fatty acid oxidation and synthesis (Green and Wakil), (ii) metabolism of the unsaturated fatty acids (Mead), (iii) the metabolism and function of phosphatides (Rossiter and Strickland), (iv) metabolism of glycerides (Bergström), (v) lipolytic enzmes (Kates), (vi) hormonal regulation of fatty acid metabolism (Langdon), (vii) formation and metabolism of bile acids (Bergström, Danielsson, and Samuelsson), and (viii) chemistry and metabolism of bacterial lipides (Asselineau and Lederer). The chapter by Bergström, Danielsson, and Samuelsson is notable not only for its wide and judicious coverage but also for its excellent literary style.

The title of this book is somewhat out of proportion to the subject matter it contains. For example, notably absent is a discussion of advances in lipid metabolism which pertain to neurochemistry and to nutrition. The discussion of lipolytic enzymes (Kates) would have been greatly enhanced had more attention been given to the differentiation of pancreatic and lipoprotein lipases. In the chapter on hormonal regulation of fatty acid metabolism by Langdon, major emphasis is placed on the effect of the anterior pituitary hormones, epinephrine and insulin; regrettably absent is a discussion of the effects of the lipid mobilizer hormone and thyroxine. Similarly, the index leaves much to be desired. For example, cholesterol does not appear in the index yet an entire chapter is devoted to the bile acids.

Few books are exempt from such minor shortcomings; they detract but little from the value of the service the authors have rendered to biochemists by writing this book. All of the chapters are well conceived, and each is concluded with adequate references to the literature. Current investigative problems are stressed throughout. This volume will serve admirably (when used in conjunction with the companion volume by Hanahan entitled *Lipide Chemistry)* as an introduction to lipid biochemistry for students and for those in biology and medicine who wish to become acquainted with the current stages of development in this field,

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Food Preservation (Except by Irradiation) (1950-1960), a new Selective Bibliography published by Office of Technical Services, Business and Defense Services Admin., U.S. Dept. of Commerce, Washington 25, D.C.

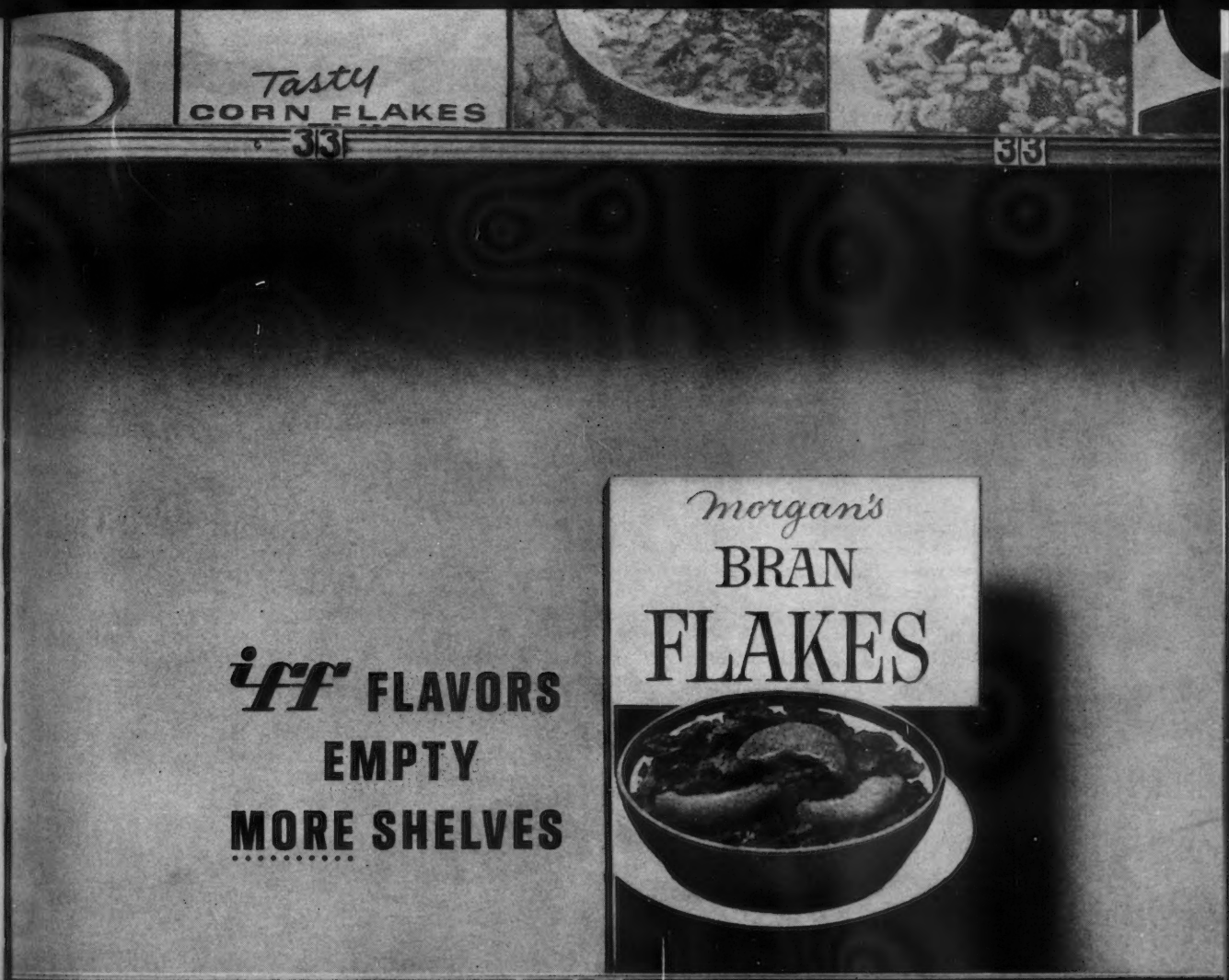
Natural Disasters

as we need to in an emergency, but we should never cease trying to increase our knowledge and operational capabilities.

The civil defense training course for food industry officials, which will be presented by the U. S. Food and Drug Administration at the Baker Hotel in Dallas, Texas, April 13-14, 1961, following the American Association of Cereal Chemists, Inc., annual meeting, will introduce and discuss some of these problems which will be faced by cereal chemists and other food industry officials.

Announcements and invitations have been sent out by the AACC, co-sponsors with the Dallas City-County Civil Defense and U. S. Food and Drug Administration. Tear-off registration slips attached to the invitations should be filled out and sent to the AACC's registration chairman, Mr. George E. Tate, P/O. Box 180, Wichita Falls, Texas, promptly.

There is no charge for registration.



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• • • People

J. Grove Baxter named director of research, and **Philip L. Harris,** director of biochemistry laboratories, Distillation Products Industries (division of Eastman Kodak Co.). Dr. Baxter became head of organic research for DPI in 1939; was later one of team who first synthesized vitamin A. Dr. Harris joined the company in 1940; became assistant director of research in 1957.

Robert K. Bequette takes position as Experimental Miller at Western Wheat Quality Laboratory, replacing **Homer Elling.** Mr. Bequette was formerly at Montana State College, Bozeman, in quality evaluation of hard red spring and winter wheats.

Kenneth A. Gilles becomes Editor of CEREAL CHEMISTRY, sister publication of CEREAL SCIENCE TODAY; the position held by the late William F. Geddes.

John H. Holborrow to represent National Starch and Chemical Corp. in Midwest in technical and sales capacity.

Walter H. C. Rueggeberg appointed to newly created position of director, research and development, Atlas Powder Co. Other personnel assignments: **William C. Griffin** and **George O. Rudkin, Jr.,** associate directors of chemical product development; **John D. Brandner** and **John W. LeMaister,** associate directors of chemical research; **F. Faxon Ogden,** research and development planning advisor.

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• • • Products

New coccidiostat. Production facilities for "Amprol," Merck & Co.'s new coccidiostat, are being expanded by 50% at the company's plant in Elkton, Va. "Amprol" was introduced in this country in October, and the FDA approved its use in combination with low-level antibiotics in December. It can now be used in finished feeds containing the growth-promoting levels of at least 4 g. of procaine penicillin or 30 g. of streptomycin per ton. It may also be used with a combination of both, as long as both antibiotics are at minimum level and the combination of the two does not exceed 50 g. It is hoped that additional clearances will be obtained in the near future for use of "Amprol" in poultry feeds in combination with high-level, disease-preventing antibiotics, and in turkey feeds. The drug is used abroad in replacement flocks and turkeys as well as broilers; in the U.S. it is cleared, up to now, only for use in broilers.

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Tube for carotene determination. A disposable, prepacked plastic tube for carotene determinations by the chromatographic method, called CHROMATO-TUBE, has been developed by Laboratory Construction Co. This standardized tube permits results that can be reproduced, and offers a means of coordinating methods between laboratories. Because it does away with mixing, measuring, packing, and washing of glassware, the tube saves time and, therefore, labor cost in the laboratory. Free samples of CHROMATO-TUBE can be obtained from Laboratory Construction Co., 8811 Prospect, Kansas City 32, Mo.

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Recording plasticimeter. The "Plasticorder," a new, high-temperature recording plasticimeter developed by C. W. Brabender Instruments Inc., is said to accurately forecast and record plastic properties of materials to 1,150°F. It incorporates the C.W.B. "Plastograph" and a measuring head of new design with a vertical mixing chamber and shaft. The sample measuring head operates within a tube furnace. Temperature uniformity is guaranteed by the manufacturer. Present owners of a "C.W.B. Plastograph" can modify their instrument with the new sample measuring head, tube furnace, and controls. For others, the "Plasticorder" can be used as is and with an assortment of standard "Plastograph" measuring heads. For complete specifications and technical bulletins, write C. W. Brabender Instruments, Inc., South Hackensack, N. J.

• • • Patter

Protein from tropical plants. A machine for the extraction of protein from the leaves of tropical plants is being constructed in Jamaica, W. I., by the University College of the West Indies under supervision of the Island's Scientific Research Council. The operation is the result of more than 20 years of experiment and research by the British Government. The unit is designed to be mobile in order to take maximum advantage of varying tropical vegetation. It will produce between 20 and 80 pounds of protein from a consumption of 1 ton of leaf or grass per hour.

• • •

Amylose separation from dent corn. A production process for separating pure amylose and amylopectin fractions from ordinary dent corn has been announced by the A. E. Staley Mfg. Co. A pilot plant at Decatur, Ill., is now separating the two basic starch components in semicommercial quantities and in reasonable degrees of purity.

The immediate significance of the Staley separation process is that it makes these fractions of ordinary corn available in quantity for the first time to develop new products and commercial applications. Among these are transparent films, plastics, coatings of all sorts, fibers, and filaments.

The new series of products has been given the brand name "Napol," with the designations "L" for the pure amylose linear polymer and "B" for the amylopectin branched polymer.

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Improved methods for rice drying. Commercial rice processors in the West are reducing costs, decreasing kernel breakage, and increasing plant capacity by adopting improved methods developed by the USDA for drying short-grain rice. Studies have been initiated to extend the findings of this research to the drying of medium- and long-grain rice in the Southern states. Research by engineers and chemists of the Western Utilization Research and Development Division, Albany, Calif., has shown how to determine exactly the processing conditions that give best results. Research Achievement Sheet No. 204 (Jan. 1961) issued by the Agricultural Research Service, USDA, gives further information and reference data.

Textures for sale

In fat-based foods *Myverol® Distilled Monoglycerides* **are widely recognized for one group of effects. In shortening, for example, they so control the tricky relationship between batter "curdle," bubble size, and cell-wall strength that a wonderful cake texture comes out of the oven. They permit peanut butter to go to the beach on a July day without leaking oil, yet spread smoothly after a week in the refrigerator.**

In starch-based foods *Myverol Distilled Monoglycerides* **have won just as big a place for an entirely different effect—the complexing of dissolved amylose. Dehydrated potato products have enjoyed their rip-roaring success because they make up into a food that looks like, tastes like, and *is* mashed potato, not library paste. Hot cereals no longer need inevitably turn jellylike a certain time after cooking.**

A very small content of these unique molecularly distilled monoglycerides profoundly affects the delicate architecture of foods. Prepared from the glycerolysis of edible fats or oils, *Myverol Distilled Monoglycerides* are exempt from the Food Additives Amendment. For technical data and prices write ***Distillation Products Industries,*** Rochester 3, N. Y. Sales offices: New York and Chicago • W. M. Gillies, Inc., West Coast • Charles Albert Smith Limited, Montreal and Toronto.

distillers of monoglycerides made from natural fats and oils

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Also . . . vitamin A in bulk for foods and pharmaceuticals

Distillation Products Industries *is a division of* **Eastman Kodak Company**

Fiscal report—Merck. Sales of Merck & Co., Inc., and consolidated subsidiaries edged up to a record high in 1960, but earnings declined for the first time since 1954, according to a recent announcement. For 1960 (1959 figures in parentheses): net sales were $218,100,000 ($216,900,000); estimated net income after taxes, $27,800,000 ($30 million), equal to $2.57 ($2.79) per share of common stock outstanding. Continuing price declines in bulk vitamins and vaccines and increased competition from foreign producers are considered to be the main causes of the 7.3% decline in net income.

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Assault on human hunger. Charles H. Bell of General Mills called on the American food industry to mobilize its resources and experience to find more effective ways to solve international food problems and raise nutritional standards everywhere. Speaking to the Grocery Manufacturers of America in convention in New York City, he proposed immediate formation of a "task force" made up of qualified personnel from member companies, and offered the full-time services of a member of his company's staff for the effort. The force would begin by evaluating all world food programs now in progress, to find the most effective means of participation open to the industry as a whole; meanwhile it would serve as a body of consultants whose knowledge would be available to the U. S. government, the UN, and others. Bell said the full effect of efforts now being made cannot be achieved without the active participation and support of the industry, and availability of its hard-won business and technical experience.

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Supplement to German journal. In Potsdam, a Central Office for Standardization has been established in connection with the Institute for Cereal Industries. This office will publish quarterly a supplement to the journal "Die Getreidemuhle," to deal with standardization problems in the grain processing industry, including standardization of test methods. Reports and working results of the International Association for Cereal Chemistry will also be published in the supplement. Those interested may write to Ing. Schneeweiss, President of ICC, Helmholtzstrasse 6/7, G.D.R., Potsdam, Germany.

Market for soybean surplus. As a result of USDA research in finding outlets for surplus produce, U. S. soybeans may soon be making an appearance in Japanese soup, according to Dodge & Olcott's **D & O News.** Improvements in methods for processing soybeans, the Department has announced, should make possible substantial increases in our exports. Varieties of U. S.-grown soybeans, tested and treated for use in "miso" and "tofu," traditional Japanese foods, have proved equal to the Japanese product. The foods account for about half the soybean consumption in Japan; "miso," a paste used in making soup, uses about 20% of the total. The U.S. now exports about 350 million bushels of soybeans a year to Japan. The Japanese hope to increase soybean consumption some 40% in the next ten years in an effort to improve the population's protein intake.

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Award to Millers' National Federation. The Export Department of MNF was recently presented with a Citation by the U.S. Department of Commerce, "In recognition of outstanding service to the U. S. Government for contributing to the success of the Office of International Trade Fairs' presentation of official United States Exhibits overseas during 1960, thereby aiding significantly in the advancement of world understanding of peace and prosperity under the American system of competitive free enterprise."

The Federation will have its annual gathering in Washington, D.C., April 23–26 (Shoreham Hotel), giving members a chance to renew old acquaintance with many friends in the Government and to meet new office-holders in the present Administration. A program featuring top-level speakers, both from the Executive departments and the Congress, is being prepared.

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"Clean Corn" poster—free. Corn Industries Research Foundation has issued a poster as part of its effort, with the Food and Drug Administration and other government agencies, to ensure the cleanliness of corn at the farm source. The poster urges corn growers to continue the war on rats and insects and to clean up the trash which makes harboring places for vermin. It measures 17 by 22 inches and is printed in two colors. Proprietors of grain elevators and feed stores, or others who are concerned about grain sanitation, can obtain one or more of these posters, without charge, by writing to Corn Industries Research Foundation, Inc., 1001 Connecticut Ave., N.W., Washington 6, D.C.

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Laboratory's quick recovery. On January 3, about 6 a.m., a water main broke under the concrete floor of the Centennial Mills laboratory at Portland, Oregon. The floor was buckled upwards and the force of the water pushed gravel and dirt all over the room. When the door was opened, a wall of water 3 feet high rushed out. All of the equipment was moved out and the floor was taken up the same day. Pipe was repaired on the 4th; the floor on the 6th; equipment was moved back on the 7th. On January 9 the laboratory was in full operation, a remarkable recovery from the damage.

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Bellera "Air Spun" process launched. The new milling process, Bellera, came officially into being in Buffalo, N. Y., on March 8, with dedication by General Mills of its modern flour mill there. The ceremonies opened at 10:30 a.m. at the west side of the new mill. Participating, besides the Bells, James F. and Charles H., were master of ceremonies Williard Meinecke, GM community representative and plant manager; city and county officials; congressmen and senators; union representatives; General Mills officials, and Buffalo employees. Also present was Dr. Rene Buhler, head of the Swiss milling equipment company which did the engineering manufacturing of the equipment for the Bellera mill.

SITUATIONS OPEN

Product Development Man with degree, and experience in Prepared Cake Mixes. Must be capable of taking charge of all laboratories for well known manufacturer. Send complete resume to: Dept. 16, CEREAL SCIENCE TODAY, 1955 University Ave., St. Paul 4, Minn.

Invitation to try
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Sweet Goods and Coffee Cakes; Muffins;
Waffles and Pancakes, etc.

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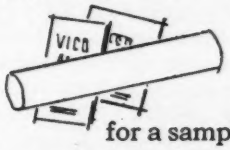
VICO 400, a unique NATURAL flavoring captures the full spectrum of flavor notes characteristic of natural yeast fermentation.

VICO 400 initiates a new concept of flavor production. It brings out—INSTANTLY—a true yeast-leavened flavor in various baked products, thereby intensifying and improving their taste appeal. It is especially effective in combination with the blander types of chemical leavening agents in such products as: dry mixes; breads; rolls; biscuits; sweet goods and coffee cakes; muffins; waffles, pancakes, etc.

VICO 400 is a dry, highly stable flavoring in powder form, easy to handle and ready to use at any time.



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BAKING BREAKTHROUGH *Fluid Flex Style.*

How Durkee Research is Revolutionizing Baking with a Fluid Shortening

THE PROBLEM: *Develop a superior emulsified shortening to meet the needs of today's wholesale bakeries.* As more and more large scale bakeries turn to automated production facilities, ingredient suppliers must adapt or develop products expressly for the bulk handling systems such facilities require. Durkee, long a supplier of emulsified shortenings to the bakery industry, turned to its Technical Service Staff to meet this challenge.

THE SOLUTION: *Liquefy, Emulsify, Infuse:* Producing emulsifiers for over 20 years, Durkee knew what potential baking improvements lay waiting the development of a workable combination of emulsifiers and oil in one pourable, pumpable fluid product . . . a product built for automated bulk handling systems. Using developmental and production procedures learned through those years of experience, Durkee perfected a method of infusing microscopic crystals of a unique emulsifier into a top quality liquid oil that produces lighter, finer textured baked goods with longer shelf life. We named this new shortening FLUID FLEX.

THE SIGNIFICANCE: *Revolutionary.* Here again, Durkee's technical competence in the fields of fats and oils led to an entirely new concept of production for an entire industry *before* the industry knew it could be done. Purposeful research is continually in progress at Durkee. Here is where we may be able to help you most whenever your product or process warrants further attention. We'd be glad to help. Just phone or write.

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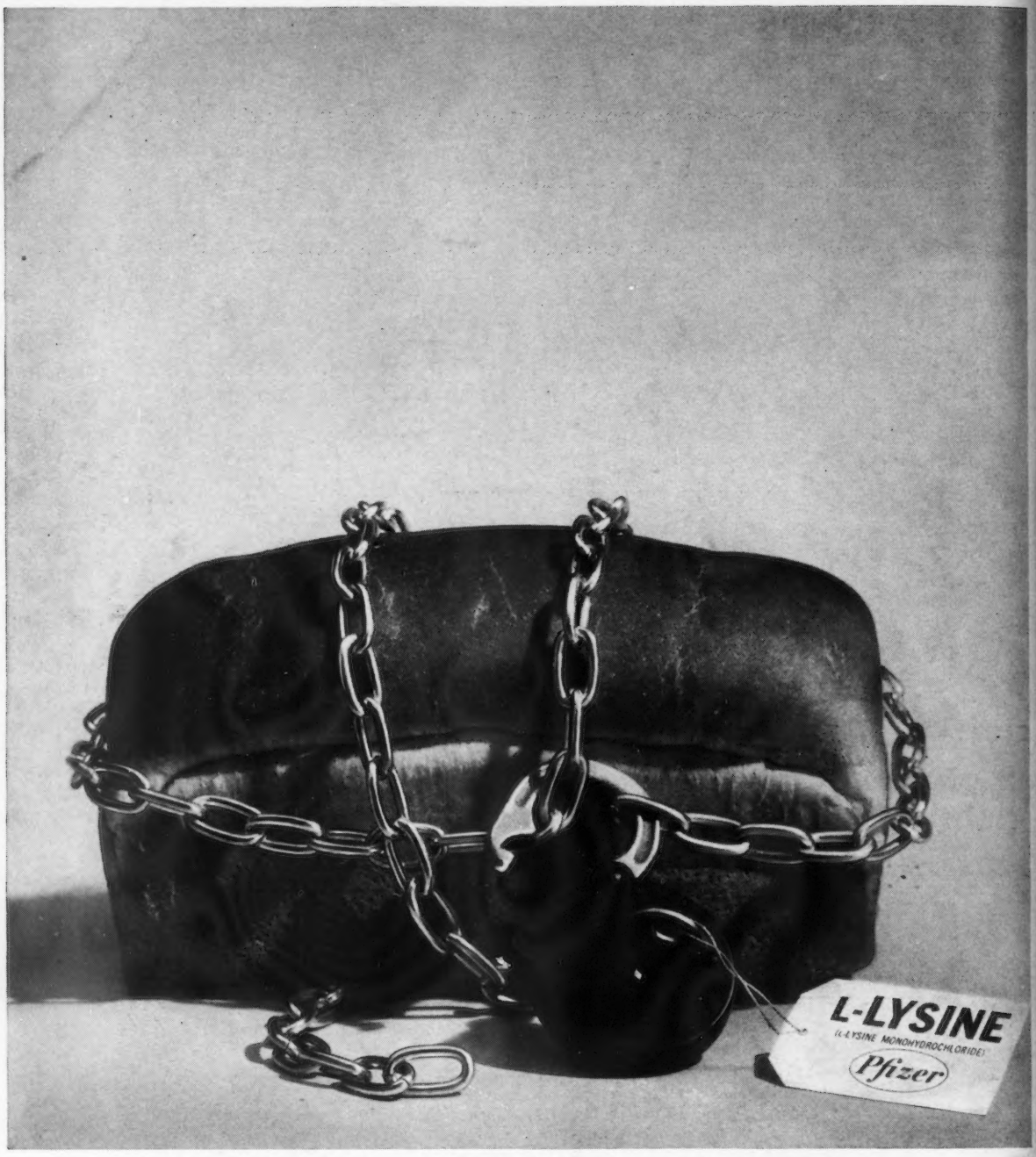

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